INTEGRATIVE POLICY INSTRUMENTS FOR IMPLEMENTING THE NATIONAL WATER ACT: A CASE STUDY OF THE MGENI CATCHMENT

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PREFACE

I, Ntombifuthi Pretty Vilakazi, declare that

(i) The research reported in this dissertation, except where otherwise indicated, is my original work.

(ii) This dissertation has not been submitted for any degree or examination at any other university.

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ABSTRACT

South Africa experienced a paradigm shift with the introduction of the National Water Act in 1998 (NWA). Previously, water resource management was based on a centralized approach. Today, it is framed by the Integrated Water Resources Management approach and rests on the three important principles of equity, sustainability and efficiency. The implementation of these principles is characterized by decentralized decision-making within a framework that brings together all water stakeholders in a new form of communication, particularly those of marginalized groups.

However, no matter how clear and ambitious the objectives of the NWA are, the problem of effective implementation remains significant. A mix of centralized and decentralized management instruments, aiming at integrated and adaptive management, has created considerable complexity. This then calls for integrative instruments to allow for greater coordination and enhanced stakeholder participation, in order to produce an integrated management outcome.

Although a set of instruments is available under the South African (SA) NWA, these do not seem to be sufficient. Perspectives emerging from a study undertaken in the Mgeni Catchment, using key-informant interviews and household surveys, suggest that this is based on a lack of institutional and management capacity, missing Catchment Management Agencies, limited monitoring and evaluation and lack of integration between the water stakeholders and other sectors that impact on the water resources. Further, it seems that specific elements are creating bottlenecks as well as a loss of responsibility in a decentralized system e.g. the National Water Resource Strategy. This study adopts a social perspective on water resource management and examines the suggestions proposed by water stakeholders in the Mgeni Catchment in relation to major constraints to the implementation process.

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EEA:	European Environmental Agency
AM:	Adaptive Management
APSC:	Australian Public Service Commission
CASA	Clean Air Strategy Alliance
CMA:	Catchment Management Agencies
CMF:	Catchment Management Forums
CMS:	Catchment Management Strategy
DBN:	Durban
DWA:	Department of Water Affairs
DWAF:	Department of Water Affairs and Forestry
GDP:	Gross Domestic Product
GWP:	Global Water Partnership
IWRM:	Integrated Water Resource Management
IUCN:	International Union for Conservation of Nature and Natural Resources
JCWRE:	Journal of Contemporary Water Research and Education
KZN:	KwaZulu-Natal
MCMF:	Mgeni Catchment Management Forum
MCMP:	Mgeni Catchment Management Plan
MDGs:	Millennium Development Goals
NWA:	National Water Act
NWRS:	National Water Resource Strategy
OECD:	Organisation for Economic Cooperation Development
PMB:	Pietermaritzburg
WMA:	Water Management Areas
WSA:	Water Services Act
UNDP:	United Nations Development Program
RQ:	Research questions
UN:	United Nations
RSA:	Republic of South Africa
SA:	South Africa

SPSS:	Statistical Packages for Social Sciences
UNICEF:	United Nations Children's Fund
WHO:	World Health Organisation
WWD:	World Water Day

1. INTRODUCTION

The National Water Act No. 36 of 1998 (NWA) is regarded as one of the most advanced pieces of water legislation in the world (Naster and Hansen, 2009; Tewari, 2009). This Act is framed through Integrated Water Resource Management (IWRM) and hence, rests on the three fundamental principles of equity, sustainability and efficiency in the management and distribution of water resources (Naster and Hansen, 2009; Stuart-Hill and Schulze, 2010; Movik and de Jong, 2011). The integrated approach to water resource management is characterised by decentralised decision-making within a framework, which brings together all water stakeholders in a transparent form of communication, particularly those from marginalised groups (Stuart-Hill and Schulze, 2010; du Toit *et al.*, 2011). However, the ambitious objectives of the NWA remain significantly problematic with regard to effective implementation. A prevailing problem of policy implementation is linked to the water sector's inadequate institutional capacity (Plummer and Slaymaker, 2007; Naster and Hansen, 2009; IUCN, 2009; Stuart-Hill and Schulze, 2010; Woodwill, 2010; Meissner *et al.*, 2013; Schreiner, 2013). The transfer of technical knowledge and skills is not sufficient for the complex situation of the South African (SA) water sector in terms of the required establishment of the sector reforms (Woodwill, 2010). Furthermore, there is a need for enhanced communication, collaboration, trust building, networking and a clear understanding of the disorganised social situations, political advocacy and leadership (IUCN, 2009; Woodwill, 2010).

The country's water governance system shows significant elements of fragmentation (Tewari, 2009; DWA, 2011; Movik and de Jong, 2011). In many areas there is high a level of disintegration between water stakeholders and various sectors that impact on water resources (Ashton *et al.*, 2006; Naster and Hansen, 2009; du Toit *et al*., 2011; DWA, 2011; Movik and de Jong, 2011). Various studies show that this is partially due to the legacy of the previous water legislation, in which water resource management was highly centralised and did not allow the civil society to influence decision-making (Naster and Hansen, 2009; Tewari, 2009; du Toit *et al*., 2011; Movik and de Jong, 2011; Quinn, 2013). In addition, recent studies show that there are two main factors underpinning the problems of policy implementation, these being the incomplete sector/institutional reforms that were imagined in the new National Water Policy and the performance of the Department of Water Affairs (DWA) itself (Woodwill, 2010; du Toit *et al.*, 2011; DWA, 2011; Schreiner, 2013).

Amongst various sector reforms, in order to enable effective water resource management at local as well as catchment level, and in order to allow previously marginalised people to influence decision-making (du Toit *et al.*, 2011; Movik and de Jong, 2011), the NWA made provision for the establishment of Catchment Management Agencies in each Water Management Area (NWA, 1998). The establishment of these entities has only partially taken place. Consequently, there is a delay which has unfortunately created more problems in the SA water sector than ever before (du Toit *et al*., 2011; DWA, 2011).

Various factors have been found to contribute to the delay, but most significantly the lack of public involvement and insufficient representation of local stakeholders and their vested interests, in particular, the poor and disadvantaged groups (DWAF, 1999; Naster and Hansen, 2009; Pollard and du Toit, 2010; Carden and Armitage, 2013). This highlights a need for more research to be undertaken on integrative instruments that will allow for greater coordination and enhanced stakeholder participation and which will also fast track the establishment of the current sector reforms, thereby facilitating the implementation of the NWA (du Toit *et al*., 2011).

The term 'policy instruments' is used to describe tools, methods and measures used by government authorities to achieve desired outcomes (CASA, 2013). 'Policy instruments' can also be defined as tools that can be used to provide solutions to problems and achieve objectives (Clean Strategy Alliance (CSA), 2013; OECD, 2008). The different types of instruments used worldwide include economic, technical, institutional, legal, administrative and participatory or social policy instruments (Plummer and Slaymaker, 2007; OECD, 2008). Various studies show that, due to the complexity of environmental issues, there is no single universal policy instrument that can provide solutions to all problems and therefore a number of various instruments have accumulated (EEA, 2012; OECD, 2008). Often, several instruments are integrated or combined together with the aim of addressing certain policy problems and, in that manner, the notion of integrative policy instruments or a policy instrument mix results (EEA, 2012; OECD, 2008).

'Integrative policy instruments' in relation to water can therefore be defined as a mix of various policy tools, measures and methods created to enable greater co-ordination and cooperation between different water users (OECD, 2008; du Toit *et al*., 2011; EEA, 2012), different stakes and views on how water should be managed. These instruments integrate

or combine various government departments because of their interest in, and impacts on, water resources.

Integrative policy instruments are especially required in the water sector, since water issues have many different aspects and therefore several policy instruments are needed to adequately address each one. Furthermore, integrative policy instruments may enable greater flexibility in finding ways to comply with the water policy, while reducing the uncertainty in the cost of doing so.

It should be noted that a set of integrative instruments is available in the South African legal framework i.e. National Water Resource Strategy (NWRS) and the Catchment Management Strategies (CMS), but these do not seem to suffice and do not appear to be designed yet for public participation (Naster and Hansen, 2009; Woodwill, 2010; du Toit *et al*., 2011).

Therefore, this dissertation adopts a social perspective on water resource management and investigates integrative instruments for the policy implementation of the NWA. In addition, the challenges associated with the effective functioning of the available integrative instruments for policy implementation are examined.

In summary, the aim of this study is to examine the possible reasons associated with the lack of policy implementation and to investigate integrative instruments for the effective implementation of the National Water Act of 1998 and the associated challenges in the establishment of the integrative policy instruments.

The research objectives for this study are:

- to identify integrative policy instruments for the implementation of the National Water Act;
- to identify major constraints and challenges affecting the process of implementation of the National Water Act;
- to examine suggestions proposed by the relevant stakeholders (both institutional and local) in relation to the major constraints and challenges affecting the effective implementation of the National Water Act; and
- to acknowledge the important links between the National Water Act (NWA) and the Water Services Act (WSA).

This dissertation is comprised of seven chapters. This first chapter introduces the study and provides an understanding of the issue and it also describes the aims, objectives and relevance of the study. The second chapter comprises of the literature review, which suggests a framework for understanding water governance in the context of this study. In addition, it discusses the challenges associated with policy implementation in South Africa and sets the scene for the next chapter through linking literature with the study's objectives. Moreover, it provides the basis for an appropriate research methodology to be used for primary data collection. Chapter Three examines and describes the research methodology used for the study. It describes the data collection method, the target population, sample size, data collection process and the limitations of the study. Chapter Four reports and discusses the results of the research findings from the primary investigation, while Chapter Five concludes the dissertation by setting out a summary of key findings and recommendations, based on the findings of the study. This last Chapter also sets the scene for potential future research.

2. LITERATURE REVIEW: WATER GOVERNANCE

The central role of water to all life on earth cannot be over-emphasized. This natural resource is vital for the welfare of all humankind socially, as well as economically, and is essential for the healthy functioning of the world's ecosystems (UNDP, 2004; Batchelor, 2007; Dukhovny, 2009). Moreover, water is often seen as 'a catalytic entry point to help developing countries deal with poverty and hunger, maintain human health, reduce child mortality and both manage and protect their natural resources' (UNDP, 2012). The role of water and its associated intrinsic value of sanitation in poverty eradication, are recognised under Target 10 of the Millennium Development Goals (MDGs), namely, to"Halve by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation" (UNDP 2003; Folifac, 2006).

Over the past 20 years, most countries, especially in the developing world (e.g. Ghana, Mauritius, South Africa, Uganda and Zimbabwe), have reformulated and modified their water policies in order to align them with achieving not only the MDGs, but also to make water management equitable, sustainable and efficient (Chikozho, 2005; Folifac, 2006). Countries, such as South Africa, have re-written their laws in order to overcome past injustices and inequalities and to ultimately achieve the equitable, sustainable and efficient use of water resources. Unfortunately, no matter how attractive and ambitious some of these laws are, for almost all of the world's poorest citizens, the equitable and efficient provision of water services still remains an unfulfilled promise (Folifac, 2006; Gowland-Gualtieri, 2007; Plummer and Slaymaker, 2007; Tissington *et al.*, 2008; Brisbane Times, 2011). This implies that there is a 'significant gap between policy and actual water allocation and hence, distribution (Folifac, 2006; Batchelor, 2007; Naster and Hansen, 2009; du Toit *et al.*, 2011).

Various studies depict that a water challenge is mainly 'this crisis in governance' (Al-Eryani, 2002; GWP, 2003; Solanes and Jouravlev, 2003; Plummer and Slaymaker, 2007; Miranda *et al.*, 2011). Hence, severe scarcity seldom results from natural limitations or insufficient funds and technical support, but rather from intense water governance failures (UNDP, 2004; Plummer and Slaymaker, 2007; Miranda *et al.*, 2011). This implies that problems arise from how 'individuals and societies have assigned value to, made decisions about and managed the water resources available to them' (Solanes and Jouravlev, 2006).

In addition, various studies indicate that water governance challenges should be dealt with through improving the capacity of water management institutions (Plummer and Slaymaker, 2007; IUCN, 2009). These studies suggest that the capacity of management institutions can be achieved by developing the capacity to implement policies in various water departments that are responsible for policy implementation (IUCN, 2009; Tewari, 2009). It should be noted that institutions in the context of this research, refers to water management organisations/departments such as DWA, CMAs, WUAs, etc. In the case of South Africa, the National Water Act (No 36 of 1998) acknowledged that the key to effective water management is linking water and other natural resources through an integrated approach. As a result, Integrated Water Resource Management (IWRM) was incorporated into all policies and is seen as the best way to undertake water resources management (Dent, 2009; Pollard and du Toit, 2008; DWA, 2011).

The IWRM framework is characterized by decentralized decision-making within a framework that brings together all water stakeholders in an innovative form of communication, particularly those from marginalised groups (Pollard and du Toit, 2010). However, the mix of centralised and decentralised management instruments aiming at integrated and adaptive management has created considerable complexity (Naster and Hansen, 2009). This therefore calls for integrative instruments to allow for greater coordination and enhanced stakeholder participation, to produce an integrated management outcome (du Toit *et al*., 2011). Although a set of instruments is available under the South African set-up e.g. water use licensing or NWRS (centralised) and water services or CMS (decentralised), these do not seem to be sufficient, as it appears that they are currently used in isolation to each other and the links between them are ignored (Plummer and Slaymaker, 2007).

Given the background, this literature review is aimed at reviewing the relevant literature on integrative policy instruments for the policy implementation of the NWA. However, it should be acknowledged that integrative policy instruments for the implementation of the NWA fall under a bigger umbrella of water governance, which is why Plummer and Slaymaker (2007) assert that challenges concerning failure to properly use policy instruments integratively in the water sector, are water governance challenges. It is therefore of vital importance to this study that the review of literature begins with the

wider topic of water governance and its purpose, on a global as well as the local scale, and only then moves to policy instruments for implementation of the NWA.

2.1 Water Governance

This section begins by providing an understanding of governance and water governance specifically. It must be understood that each of these concepts are disciplines in their own right, therefore it is necessary to describe and define them individually, to emphasise and establish their relationship. Furthermore, the current global prominence of water governance, water governance capacity, the status of water governance in South Africa (SA) and the country's water management policies, will be introduced and described in this section.

The term 'governance' is given various definitions by different users and has gained prominent attention from various government departments and agencies ever since the twentieth century. Paproski (1993) generally defines governance as the management process which involves interaction between the public sector and the various actors in civil society (see also Harpham and Boateng, 1997). On the other hand, the United Nations (2006) assert that a more inclusive and more precise definition of governance was given by Hirst (2000) when he expressed it as a means of "creating an effective political framework conducive to private economic action". Hirst (2000) further expressed that good governance includes stable governments, clear laws, well-organized State administration modified to the roles that governments can perform, and a strong civil society, which is free from the State's influence (UN, 2006).

From the stated definitions by Praspoki (1993) and Hirst (2000), it can be clearly seen that the fundamental difference between governance and government is the role of civil society and the interaction between the two, whereby civil society refers to the individuals and institutions which are independent of state control (Harpham and Boateng, 1997). Moreover, according to the United Nations Development Programme (UNDP, 2013), good governance incorporates four poverty-centred dimensions, namely, political, economic, social and environmental. Notably, from the definitions of good governance described above, only three dimensions of governance are visible in the undertaking of decision-making: the political dimension (governance includes stable governments and clear laws), the economic dimension (governance allows for economic action) and the social dimension

(governance includes civil society, which is independent of the State's influence). The fourth one, which is the environmental dimension, is not evident in the definition stated above. The main cause for concern associated with this, is that the lack of recognition of the environmental dimension, when defining governance, may result in ignorance of the environmental-related impacts when dealing with water management issues.

Therefore, drawing from the existing definition of good governance by both Hirst (2000) and the UNDP (2013), this dissertation defines good governance as a higher level of the management process that includes interaction between the government or public sector and civil society, with the hope of creating an effective political system that is conducive to sustainable economic action, natural resource management and livelihood wellbeing.

It is important to note that the word governance and management are not inter-changeable. Governance focuses on controlling all the activities of the sector i.e. it is concerned with the vision of the sector and translation of that vision into policy (Grigg, 2011). On the other hand, management operates at the level of service organization and is concerned with making decisions to implement policies. Clearly, governance is at a higher level than management. It consists of higher level oversight that is designed to ensure that things are done right (Grigg, 2011).

Governance, as applied to water, is also defined differently by various users. However, the most widely accepted definition of water governance was given by the Global Water Partnership (2003), stating that water governance comprises of a "range of political, social, economic and administrative systems that are in place to develop and manage water resources, and manage the delivery of water services at different levels of society". Various other authors have incorporated a similar definition (Rogers and Hall, 2003; JCWRE, 2006; Plummer and Slaymaker, 2007). Expanding from the GWP's definition, Castro (2007 p.107) states that "water governance involves interactions between governments, businesses, political parties, civil and other organizations representing sector interests, international agencies, NGOs and other relevant power holders". The role-players mentioned in Castro's definition are involved in engagements and socio-political engagements about 'how water and the necessary water services should be administered, by whom and for whom'. In addition, these engagements are guided by the democratic water governance, which is not only characterised by discussions and negotiations, but

also, unfortunately, by increasing uncertainty and socio-political conflicts (Miranda *et al*., 2011).

According to the UNDP (2013), it is important to note that the water sector is part of the wider social, political and economic development of a country and, therefore, such developmental decisions impact on the water sector as a whole. Castro (2007) accordingly notes that, while a high level of advancement has been reached in water-related fields of science and technology, it is still going to take some time for anyone to understand the historical, cultural, socio-economic and political processes underpinning water governance and hence, the water crisis. Castro (2007 p.99) thus concludes that "achieving water governance that is grounded on the principles of equity and sustainability is by far the most cause for concern in the water sector today".

As a means of developing an enabling environment in order to address the existing water governance predicament, the IUCN (2009) and UNDP (2013) suggest considering the following key issues:

- the principles of equity, sustainability and efficiency in water resource and services allocation and distribution;
- the need to incorporate an integrated approach to water management and the urgent need to balance out water use between socio-economic activities and ecosystems;
- the development, reformulation and implementation of water policies, legislation and institutions; and
- the clarification of the roles and responsibilities of government institutions, civil society and the private sector concerning ownership, management of water resources and associated services.

Notably, the four suggestions stated above have been widely explored in South Africa through the principles of NWA, yet their full implementation remains a major challenge. Thus the scope of this dissertation includes the examination of the reasons associated with the lack of implementation of these suggestions, as they form the main principles of the NWA.

Having briefly discussed the notion of water governance, it should be noted that there is no universally accepted definition of this term. However, this dissertation rests its understanding around water governance on the definition given by GWP (2003).

2.1.1 Why water governance matters

Effective governance is critically important because, when practised, it can solve the complexities in water management that have resulted from the increasing demand for water (UNDP, 2004; Batchelor, 2007; Moriarty *et al*., 2007; IUCN, 2009). According to Hoekstra (2011) and the UNDP (2012), the way a country decides on how to govern its water resources and services has a fundamental effect on people's livelihood opportunities, as well as the sustainable development of water resources. Effective water governance can potentially provide measures for poverty alleviation and is therefore important to the wellbeing of human society as a whole (World Bank, 2011).

The main reason why water governance matters so much, is summarized in Figure 2.1:

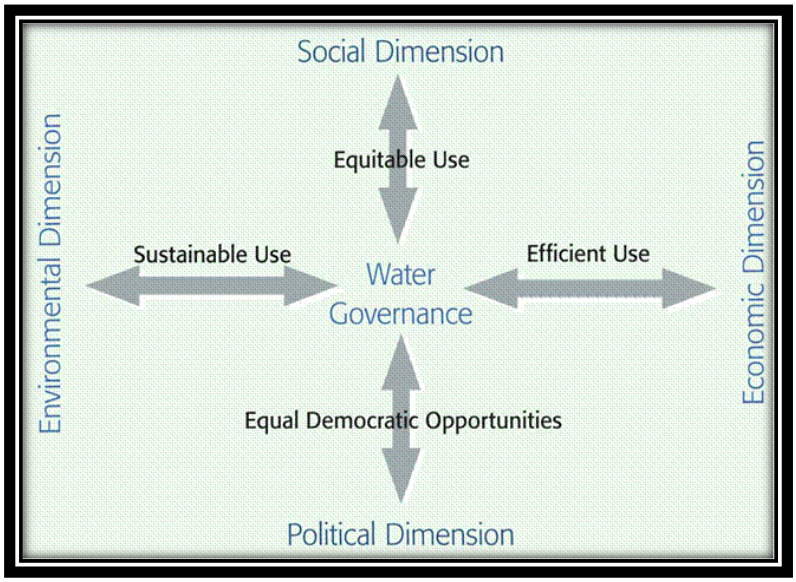

Figure 2.1 Dimensions of effective water governance (Source: UNDP, 2013)

As shown in Figure 2.1, there are four inter-linked and poverty-related dimensions of good water governance. These dimensions include the social, economic, political and environmental dimensions. Notably, the **social dimension** of water governance emphasizes the importance of the equitable use of water resources. This dimension is designed to ensure that even though water is heterogeneously distributed spatially and in time, it should

be evenly distributed to everyone, regardless of the socio-economic status of society, both in rural and urban settlements (UNDP, 2013).

The **economic dimension** of water governance recognizes that water plays an important role in poverty reduction and the economic development of a country and hence emphasizes the importance of the responsible use of water resources, in order to ensure efficiency (UNDP, 2013).

The **political dimension** of water governance acknowledges that, in order to ensure effective water management, every citizen should be granted equal opportunities to influence and monitor political decision-making related to water (Miranda *et al*., 2011; UNDP, 2013). This dimension suggests that all levels of government and civil society, including the previously marginalized citizens, such as indigenous people, slum dwellers and women, should be recognized as legitimate stakeholders and should be given opportunities to influence water-related decision-making.

Last, but not least, the **environmental sustainability** dimension recognizes the importance of the enhanced sustainable use of water resources and ecosystem integrity (UNDP, 2010; UNDP, 2013). This dimension acknowledges that sufficient good water quality is critical to maintaining ecosystem functions and services. However, in reality, this is usually an unfulfilled dream. Various studies show that water quality continues to deteriorate in most regions with intensive agricultural, urban and industrial development (UNICEF WHO, 2008; World Water Day, 2010). Unfortunately, with such deterioration of water quality, the health of the poor is usually put in jeopardy, as they tend to reside in environments that are prone to pollution, droughts and floods (UNICEF WHO, 2008; UNDP, 2012).

This section has clearly shown the importance of water governance and has especially emphasized the important link for the South African case between ‘good’ governance and poverty reduction. According to Pollard and du Toit (2008), coordination between various water institutions and other sectors related to water management is crucial in achieving effective water governance. Hence, the next sub-section will discuss the notion of co-ordination in water governance.

2.1.2 Coordination in water governance

It does not matter whether it is in developed or developing countries or whether water is scarce or plentiful, water governance remains in a state of confusion and remains one of the greatest challenges facing human civilisation worldwide (Castro, 2007; OECD, 2011; Hoekstra, 2011; UNDP, 2013). This is more of a concern, as regardless of location or life style, various life components are connected by water, one way or another (Castro, 2007; OECD, 2011).

Furthermore, due to the trans-boundary nature of water, it has also been understood by many that water problems do not only occur locally or nationally, but are also found on a global dimension (Hoekstra, 2011; Biggars, 2012).

Achieving effective water governance demands a much broader approach that allows enhanced cooperation with other forms of governance (Hoekstra, 2006; Hoekstra, 2011). It is therefore important to note that, 'coordination' (internal and external) in the context of water governance, is extensively emphasized in this dissertation.

Given the notion of coordination, effective water governance does not rest on the question of which instruments are available or which arrangements water managers can make, to solve the water problems of today and of the future (UNDP, 2006; Plummer and Slaymaker, 2007; IUCN, 2009; Hoekstra, 2011). A much broader question one should address is how various water stakeholders and civil society as a whole, can manage their water resources in a coordinated manner (UNDP, 2006; Plummer and Slaymaker, 2007; IUCN, 2009; Hoekstra, 2011). In this way, 'effective water governance' has a much broader perspective than that of the water manager.

The distinction between water management and water governance lies in the control function (Grigg, 2011; UNDP, 2013). Water management controls and monitors the usage of water resources, in order to ensure that the needs of society and the environment are met (Grigg, 2011). Water governance, on the other hand, controls water management to ensure that it fulfils its function (Grigg, 2011). If the two were to work in a perfectly coordinated manner, enough water would be provided to meet human and environmental needs, thereby ensuring the equitable access, efficient use and sustainability of water resources (Grigg, 2011; Hoekstra, 2011). Given the distinction between water governance and water

management, it becomes clear that enhanced coordination for effective water governance is significant and carries with it the necessity of coordinated water management, where the input of all stakeholders, including the poor, is welcome.

One important factor for effective water governance is water governance capacity. This is discussed briefly in the following section. According to IUCN (2009), a precondition for effective or 'good' water governance is its capacity to implement effective water arrangements and reforms (*cf.* Section 2.1.3). Thus, the next section will discuss water governance capacity.

2.1.3 Water governance capacity

Water governance capacity (also known as governability) is defined as the society's ability to implement effective water arrangements through policies, laws, institutions, regulations and compliance mechanisms (Kauzya, 2002; MacKay *et al*., 2004; Plummer and Slaymaker, 2007; IUCN, 2009). IUCN (2009) further adds that, in order to achieve a system of effective water governance, it is necessary for a country to develop all of the components of water governance capacity (policies, laws and institutions and the four dimensions of effective water governance, namely, the social, political, economic and environmental dimensions) and to implement them effectively.

Notably, water governance capacity requires clear policies, a clearly established legal structure, effective institutions, appropriate and sufficient financial and human resources for water supply activities, dedicated people and experts performing allocated roles, improved access to information, and most of all, integrative policy instruments in order to allow for effective water governance (UNDP, 2004; Plummer and Slaymaker, 2007; IUCN, 2009).

One way in which the country can assess the efficacy of its water governance is through looking at its governability, which is also known as governance capacity and is defined as the ability of a country to implement water policies. Hence, the next section will consider more closely the water policy implementation situation in South Africa as the case study under investigation lies within this country.

2.1.4 Water Policy in South Africa

South Africa has semi-arid climatic conditions, with an average annual rainfall of 500 mm and characterised by high annual variability and unpredictability (Nomquphu, 2005; McKay, 2004; Stein, 2005; Ashton *et al.*, 2006; Folifac, 2006; Naster and Hansen, 2009; du Toit *et al.*, 2011; DWA, 2012). Prior to democratisation in 1994, water supply responsibility in South Africa was highly centralised, with the national government being the only body responsible for water resource management (Tewari, 2009; Movik and de Jong, 2011; du Toit *et al.*, 2011). This resulted in an uneven distribution of water resources and water services between various ethnic groups (Anderson *et al.*, 2008; Naster and Hansen, 2009; Movik and de Jong, 2011). Exacerbating the issue further, was the lack of comprehensive national water legislation and effective administrative support structures (Muller and Lane, 2002).

Abrams (2000) and Thompson (2006) note that before democracy, the policy and functions of the Department of Water Affairs and Forestry (DWAF) were concentrated on irrigation and forestry. As a result, this impacted badly on the water sector and the environment in general i.e. out of a total population of about 41 million at the time, an estimated 15.2 million (of which 12 million lived in rural areas) did not have access to the basic water supply and 20.5 million, were denied basic sanitation(Thompson, 2006).

Therefore, the post-apartheid government developed a new legal framework and policies, which initiated an extensive reform process in the water sector (RSA, 1999; Pegram, 2000; Eberhardt and Pegram, 2000; Thompson *et al.*, 2001; Ashton *et al.*, 2006; JCWRE, 2006; Naster and Hansen, 2009; Tewari, 2009; du Toit *et al.*, 2011). This reform process will still continue for years to come, due to fact that reforming the entire governance system is extensive, dynamic and costly (Medema *et al.*, 2008; Tewari, 2009; Movik and de Jong, 2011). Eberhardt and Pegram (2000) and Tewari (2009) refer to this process of reform in water policy and its associated institutional structure, as an evolutionary process, occurring over a long period.

The reform process was mainly driven by the need to address and rectify the inequity issues that resulted from the previous political system, together with the need to ensure that sufficient water is continuously supplied, in order to meet the increasing demands of people accruing from increased industrialization and urbanization, and lastly, to encourage

the efficient use of water (Pegram, 2000; Farolfi, 2004; Ashton *et al.*, 2006; Ashton *et al.*, 2005; Movik and de Jong, 2011).

Notably, the National Water Act (No 31 of 1998) and the Water Services Act (No 108 of 1998) are the two core pillars of the new water legislation. These are linked through the sanitation business cycle, the details of which will be given in Section 2.2.1.

2.1.5 Integrated Water Resource Management

As mentioned earlier, one of the major drivers of the formulation of the new water policies in South Africa was to allow for greater coordination between water managers and other water users, in order to facilitate the equitable, sustainable and efficient use of water resources. Therefore, the new national water policy, specifically the NWA, makes provision for the management of water resources in an integrated manner through Integrated Water Resource Management (IWRM) (Anderson *et al*., 2008; Pollard and du Toit, 2008; Naster and Hansen, 2009; DWA, 2012). IWRM is primarily concerned with the reformulation of water governance arrangements (Medema *et al*., 2008) and is defined as a "process for coordinated planning and management of water, land and environmental resources. It takes into account the amount of available water, water use, water quality, environmental and social issues as an integrated whole, in order to ensure sustainability, equity and efficiency" (Global Water Partnership, 2000).

IWRM therefore, allow different water users with different stakes and views to influence water management. This should enable them to arrive at a single strategic plan for specific hydrological planning (du Toit *et al*., 2011) and overall management. Hence, IWRM is designed to enable collaborative planning and the improved participation of all citizens to influence water-related decision-making. The idea is to decentralize decisions, in order to promote multi-scale coordination and integration as a means of achieving improved water resource sustainability, thereby achieving a more holistic management of water resources and services (Medema *et al*., 2008).

Working hand in hand with IWRM is the concept of Adaptive Management (AM), which is defined as "a systematic process for improving management policies and practices by learning from the outcomes of management strategies that have already been implemented" (Pahl-Wostl *et. al*., 2007 p.3). AM promotes and embraces social learning

from the outcomes of new policies and practices by an adaptive multi-disciplinary and systematic approach to water management (Medema *et al*., 2008). An adaptive approach to water resource management recognizes that management strategies and goals have to be adapted, as new information becomes available (NeWater, 2007). A good example of the adaptive approach to water management is the importance of considering who is involved and what kind of information should be taken into account (Pahl-Wostl, 2007). An adaptive approach to water management is also more appropriate for water resources management nowadays, as major challenges of global change are being faced, particularly the impacts of climate change (Mackay and Rogers, 2003; Pahl-Wostl, 2010).

IWRM is concerned with reformulating the system of water governance, in order to implement positive change in the way in which water is managed (i.e. creating a better understanding and a clearer link between human and ecosystem requirements and the interactions between them). It also aims to manage human "activities in a manner that promotes sustainable development (improving livelihoods without disrupting the water cycle" (Medema *et al*., 2010 p.3). AM, on the other hand, is concerned with focusing authorities and citizens at large on the idea of learning (even from previous governance failures) as a key way of governing socio-ecological systems into which on-going change is embedded per se. This is especially important during periods of sudden and dynamic change, thereby promoting adaptability. In this way AM is trying to change the way in which relevant authorities view and manage water resources in times of unexpected change (Medema *et al.*, 2008; Pahl-Wostl, 2010). Specifically in the case of South Africa, AM is highly relevant, as it will provide measures to adapt to a new democratic and decentralised system, considering the protracted process of change in the country (du Toit *et al*., 2011).

The main objectives of both the NWA and WSA are to achieve equity in water allocation, as well as sustainability and efficiency in water use (DWA, 2005). This implies that there are important links that should be acknowledged between the two Acts. The next section therefore gives an overview of these linkages through the sanitation business cycle.

2.1.6 Linking the WSA and the NWA through the Sanitation Business Cycle

The provision of water services and the management of water resources are inseparable. This is explicitly shown by the water and sanitation business cycle demonstrated in Figure 2.2.

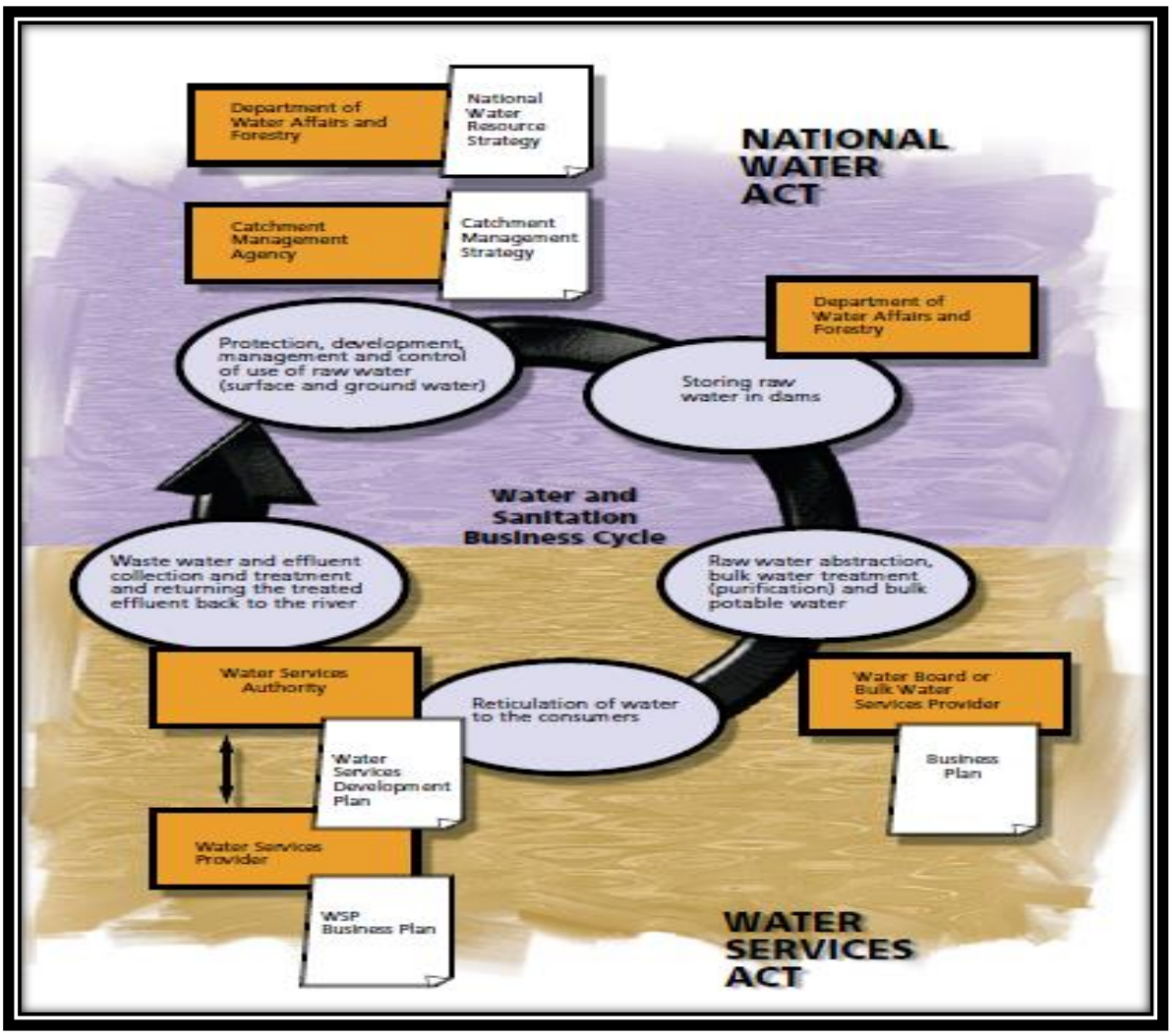

Figure 2.2 Appreciating links between the National Water Act and the Water Services Act through the Sanitation Business Cycle (DWA, 2005)

Figure 2.2 shows that implementation of the National Water Resource Strategy (NWRS) and the Catchment Management Strategy (CMS) of the NWA, the protection, development, management and control of the use of raw water will be ensured. It also ensures the safe storage of raw water in dams through the DWA. Raw water abstraction and bulk water treatment are guided by both the NWA and WSA, as it is in terms of the NWA that the municipalities, water boards and bulk suppliers obtain the legal use of the

water that they require for distribution to consumers (by means of water use licence applications to the DWA) (DWA, 2005; DWA, 2006).

The NWA also guides municipalities on how they may return effluent and other waste water back to the water resource. The WSA then has to ensure that the municipalities accordingly allocate the obtained water to consumers and to ensure that the used water is treated accordingly and returned to the relevant water resources in a required state of quality (DWA, 2005). This is where the links between the two Acts lie. Both the NWA and the WSA aim at equity, sustainability and efficiency in water management (DWA, 2005). Hence, both these Acts contribute to social and economic development.

Notably, cooperation between all role players in water resource management and service delivery is essential and this can be best achieved by treating the NWA and the WSA as integrated Acts (DWA, 2005; DWA, 2006; NWRS, 2013). Having identified the links between that main two Acts guiding the management of water resources and services, the next section will review literature on the implementation of policies, with specific reference to the NWA.

2.2 Implementation of Water Policies

The Water Resource Management Reform Process documented by Abrams (2000) provides a plan for the implementation of the water sector reforms that had been introduced by the National Water Policy and the National Water Act of 1998. Those reforms included the introduction of the Water Services Act and National Water Act, which called for more reforms to be implemented in the form of water sector institutions.

According to Abrams (2000) and Moriarty *et al.* (2007), the effective implementation of water policy can be obtained by following the governance/management cycle as shown in Figure 2.3 below.

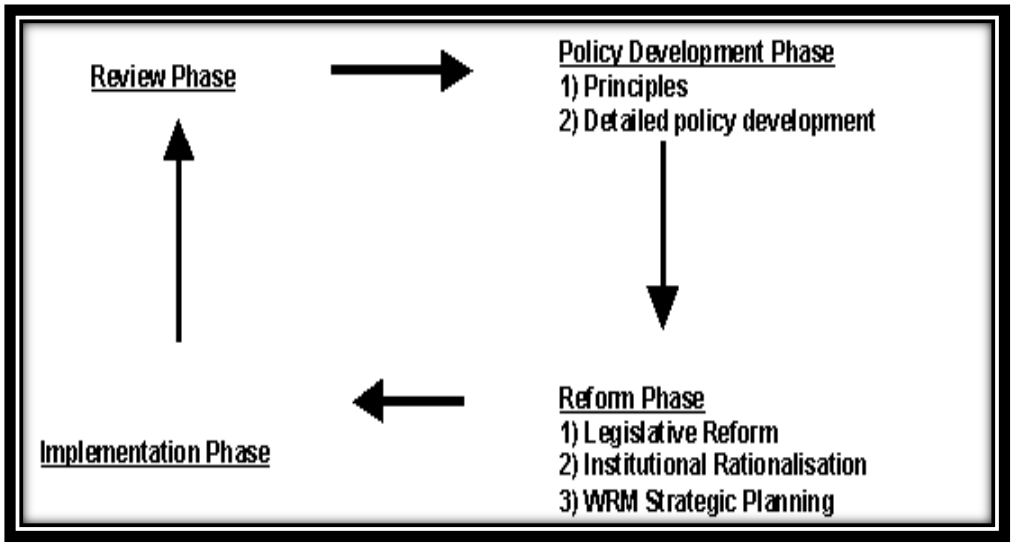

Figure 2.3 Phases of the Governance Cycle (Source: Abrams, 2000

The governance cycle consists of four phases, all of which are important and should be followed carefully. It must, however, be noted, that the reform phase is considered the most important phase in achieving the effective implementation of policies, as it constitutes the phase where approved policy is integrated into legislation, institutional arrangements, as well as into the planning activities associated with water resource management (Abram, 2000). The latter includes strategic planning, which determines whether the policy will be implementable or not, and what time frames are needed for the effective policy implementation process. The governance/management cycle is continuous and therefore, after the implementation phase, it continues to the review phase (Figure 2.3), so as to ensure the continuous monitoring of progress (Abram, 2000).

Various studies show that the governance cycle has proven itself effective in policy implementation. Furthermore, these studies indicate that more often the governance 'cycle' is not treated as a cycle in practice (Abrams, 2000; Moriarty *et al.,* 2007). Usually after the implementation phase the cycle ends and there is no continuous monitoring and evaluation of the process. This mostly leads to the process of policy implementation being hindered (Abrams, 2000) and the aims of adaptive management being defeated.

So the question must be raised as to what tools – especially in the implementation phase - would be needed to achieve policy implementation. As discussed previously, this will strongly rest on the existing legal framework that is pre-given. In South Africa, the implementation of policies such as the Free Basic Water, has mainly been in the form of tools such as strategies, procedures and guidelines i.e. the Implementation Strategy for Free Basic Water of 2002 (Gowland-Gualtieri, 2007). Some countries have incorporated social or participatory instruments, such as community of practice and social learning activities (Wenger, 1999; Pahl-Wostl *et al*., 2007).

Policy instruments can be described as tools and methods used by governments or policy makers to achieve desired objectives (OECD, 2008). Plummer and Slaymaker (2007) present a blend of policy instruments in Table 2.1.

Table 2.1 Instruments for Policy Implementation (Source: Plummer and Slaymaker, 2007)

Policy Instrument	***Description***
Technical	Mechanisms used in water resource management mainly in the design of structures that are used to control, store and supply water for different purposes. .
Economic	Mechanisms for responsible allocation and efficient use of water resources such as pricing, charges, subsidies and penalties.
Administrative	Management tools and decision support such as information systems, maps/models, plans, guidelines and other.
Legal	Laws and regulations underpinning the restrictions or prohibitions of different water uses such as abstraction, discharge, and disposals permits, codes of conduct, municipal bylaws, and minimum standards.
Institutional	Mechanisms for enhanced coordination and partnership, regulatory / governing bodies on different levels of government, management arrangements and planning procedures,
Social/Participatory	Mechanisms to increase the level of awareness on water issues and for mobilizing users to participate in planning, management and financing of water resource development.

Each policy instrument in Table 2.1 represents an important aspect of water governance and various studies reveal that much useful research has been done in relation to each (Herbertson and Tate, 2001; Batchelor, 2007; Plummer and Slaymaker, 2007; OECD, 2008). According to the European Environmental Agency (EEA, 2012) and the Australian Public Service Commission (APSC, 2008), there is no one universal policy tool or instrument that can provide solutions to all policy problems. Thus, it means that policy

instruments displayed in Table 2.1 should be all integrated or applied in an integrated way. In addition, the links between them should be recognized (Plummer and Slaymaker, 2007). The benefits of acknowledging the links between policy instruments is that the implementers would be able to see a broader perspective of how various water components fit together into one logical system (Dent, 1998; Plummer and Slaymaker, 2007; OECD, 2008).

In addition, environmental issues often have many different aspects and as a result several policy instruments may be required to be combined, in order to adequately address each issue (OECD, 2007). Governments may therefore consider using a number of different types of instruments when dealing with policy issues (OECD, 2008; EEA, 2012). Usually an 'instrument mix' is formulated to address water governance related issues (OECD, 2008). The benefits associated with using a mix of instruments is that it allows greater flexibility in discovering ways to ensure compliance with various government policies, while at the same time it reduces the uncertainty in the cost of doing so.

However, instrument mixes need to be carefully formulated, in order to ensure that the individual mechanisms within them do not underestimate each other or create unnecessary costs in ensuring compliance. Specifically relating to the South African water policy, the NWA makes provision for water management strategies as one of the many tools to ensure its implementation. These are the National Water Resource Strategy and the Catchment Management Strategy.

2.2.1 National Water Resource Strategy

The National Water Resource Strategy is meant to integrate and coordinate all water institutions and water users. Its main purpose is to ensure the implementation of the NWA through facilitating the proper management of the nation's water resources, providing a mechanism for the protection, use, development, conservation, management and control of water resources for the country as a whole (NWRS, 2013). The NWRS should also provide a framework, which will guide the management of water resources and services at regional or catchment level in the defined water management areas (DWA, 1999). Information about all aspects of water resource management in SA must be provided in the NWRS (DWAF, 1999).

According to the NWA (1998), the Minister is obliged to update the NWRS every five years. Moreover, the NWRS must ensure that there are enough water resources available to satisfy basic human needs and to cater for socio-economic development, both now and in the future. In order to achieve these goals, stakeholder consultation and participation is critical (DWAF, 2005; du Toit *et al*., 2011; NWRS, 2013).

2.2.2 Catchment Management Strategy

Water resource management functions in South Africa are divided into nine (previously ninteen19) Water Management Areas (WMAs). The NWA requires that a strategy to guide water management at catchment level be developed. Hence, this strategy is referred to as the Catchment Management Strategy (CMS). The NWA also requires a Catchment Management Agency (CMA) to be established for each WMA. The CMA is then responsible for developing a CMS for its WMA (DWAF, 2002). This implies that the Catchment Management Strategy is developed as a main tool to enable the implementation of the NWA at catchment level. Key elements of the CMSs include being aligned with the national and regional plans, the classification of the resource, licensing issues enabling public involvement in facilitating management of water resources (DWAF, 2002).

This strategy also needs to guide the way in which Water Management Institutions (WMIs) in a Water Management Area should perform their functions. However, where there is no CMA established, the DWA regional offices should perform the CMA functions as a Proto-CMA (DWAF, 2002).

2.3 Current Situation of NWA Implementation in SA

Mandated in the new National Water Policy (NWA, 1998) are the institutional reforms designed to redress the mistakes of the past and to provide adaptive capacity to the paradigm shift in water governance (DWA, 2011). However, recent literature reveals that the envisaged institutional reforms have not been fully implemented (Simpungwe, 2003; Naster and Hansen, 2009; Tewari, 2009; du Toit *et al*., 2011; Movik and de Jong, 2011; DWA, 2011). Moreover, the water sector is at a critical juncture where water resource management and service delivery are not at the level that it should be. Progress in the essential transformation in the sector, particularly related to delegation of water resource management to the regional level, has been much slower than anticipated (Naster and

Hansen, 2009; du Toit *et al*., 2011; DWA, 2011; Carden and Armitage, 2013). Moreover, the status quo threatens water security and carries with it the unacceptable economic and socio-political risks for the country (Movik and de Jong, 2011; DWA, 2011). Instead of bringing the anticipated change, the slow establishment of the sector reforms has created more problems than at the time of policy reform i.e.

- it has lowered staff drive and morale and therefore has resulted in poor water resources management performance and outcome (DWA, 2011);
- it has weakened the Department's performance of its direct water resource management functions, as well as its regulatory, oversight, support roles (DWA, 2011); and
- the uncertainty around the establishment of Catchment Management Agencies (CMAs) in particular, has weakened staff interest i.e. it has taken too long to establish CMAs in such a way that the staff's enthusiasm of being part of what has faded and there is now hesitation to move across to CMAs, once they are established. Furthermore, staff recruitment and retention have been negatively impacted (DWA, 2011; Meissner *et al*., 2013).

According to the DWA (2011), even though a range of factors contribute to the current poor state of water management and services, the two key underlying factors are incomplete institutional reforms and the performance of the Department itself. The existing institutional arrangements are failing to ensure sustainable water resources management.

As a result, the Department made efforts to rectify the situation and to support the implementation of the envisaged institutional reforms. The following section will therefore give an overview of the progress that the Departments have made to date with regards to the implementation of the institutional reforms.

2.3.1 Progress to date on sector reforms

To date, the DWA has developed various institutional options for improving the management of water resources infrastructure.

These options are demonstrated in Figure 2.4

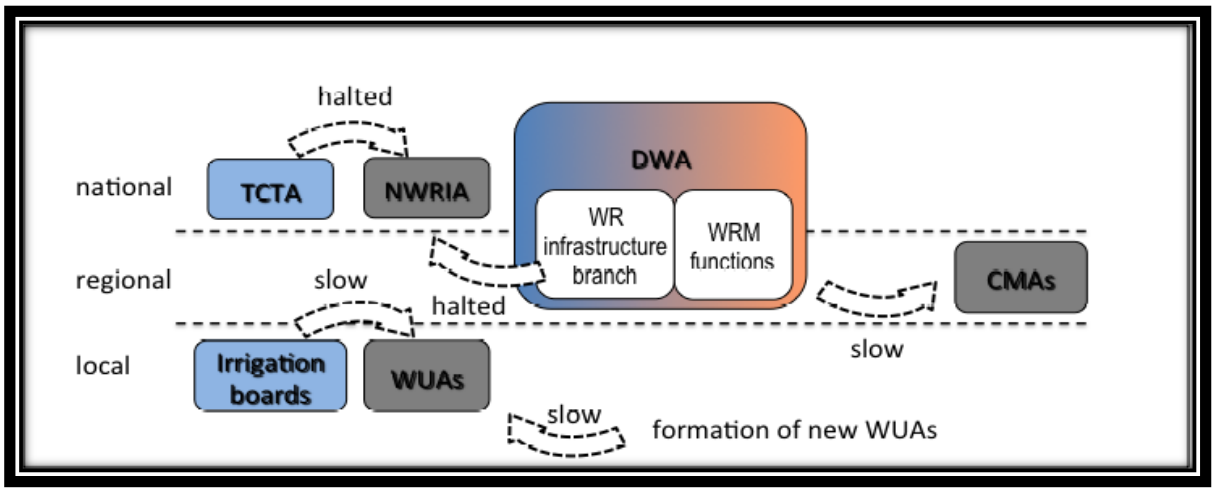

Figure 2.4 Incomplete water resource institutional reform (Source: DWA, 2011)

Figure 2.4 demonstrates that the options that were developed by the DWA for improving water resource infrastructure management include:

- The establishment of the public entity Trans Caledon Tunnel Authority (TCTA), which included the establishment of the National Water Resource Infrastructure Agency and the internal water resources infrastructure branch at DWA.
- The establishment of Catchment Management Agencies:
  Following the concerns that some of the initial 19 WMAs were not economically viable due to the limited technical human resources, capacity, skills and expertise in some of them, these have been delimited to nine, to enable integrated planning. These include: Limpopo, Olifants; Nkomati/Usutu/Pongola; KZN Rivers; Vaal; Orange; Eastern Cape Coastal Rivers; Western Cape South Coast Rivers; and Western Cape West Coast Rivers (Naster and Hansen, 2009; Movik and de Jong, 2011; DWA, 2011). Progress to date also includes the establishment of Water User Associations and the transformation of Irrigation Boards to Water User Associations. However, the latter is outside the scope of this study, hence it will not be discussed in the literature review.

2.4 Facilitating a Way Forward: Considering a Mix of Instruments for the Implementation of the NWA

Section 2.4.1 defined and discussed the instruments for policy implementation (also known as water governance instruments). From this section it was evident that there is a general

tendency in the water sector to ignore, or a failure to recognise, the links between various policy instruments, usually resulting in serious implications on the implementation process of policy.

Various studies indicate that there is no shortage of policy instruments in the SA water sector (Batchelor, 2007). However, they indicate that there is need to integrate the available policy instruments and tools, as they are currently treated in isolation to each other (Plummer and Slaymaker, 2007). Moreover, the studies suggest that the integration of these instruments in a systematic manner has the potential to increase the ability to implement various approaches to water management and therefore there is a need for further research to be undertaken on integrative policy instruments and their role in achieving the desired implementation of the NWA (Herberson and Tate, 2001; Batchelor, 2007; Plummer and Slaymaker, 2007; Pahl-Wostl, 2010; Tailor, 2010; Woodhill, 2010).

Regarding this, Dent (1998), affirms that successful implementation cannot be hoped for, if the relationship between different policy tools is not understood. The challenge is therefore to combine or mix these instruments in a more systematic manner in such a way that they are brought into everyday use (Batchelor, 2007; Plummer and Slaymaker, 2007).

Even though a wide range of policy instruments are practised in South Africa and have proved to be effective, to a certain extent, various studies suggest that more attention should be given to social/participatory instruments (MacKay and Rogers, 2000; Mack *et al*., 2005; Batchelor, 2007; Plummer and Slaymaker, 2007). This is mainly because social/participatory instruments provide a platform for using all other policy instruments in an integrative manner. These instruments can be used to create stakeholder platforms in order to achieve effective water governance, which is characterised by approaches that are transparent, inclusive, integrative and accountable. In addition, participatory policy instruments assist water resource managers to mobilize users to participate in the planning and management of water resource development.

According to du Toit *et al*. (2011), several such integrative participatory/social tools are available in South Africa in the overall catchment management strategy, in the form of Catchment Management Fora (CMFs) and Catchment Management Committees (CMCs). Furthermore, various studies suggest that integrative participatory tools should be accompanied by a strong social learning dimension, in order to allow for collective

decision-making in integrated water resource management (Pahl-Wostl and Hare, 2004; Pahl-Wostl *et al.*, 2007). Notably, in the South African context this is offered if the review of policies and their participatory approach is applied with this in consideration. Given all this information on water governance and the current situation of water management in the South African framework, the next section will provide a brief discussion and conclusion of the reviewed literature in this study.

2.5 Discussion and Conclusion

Due to its unquestionable importance and its central nature as a shared resource, water should be managed in a manner that will ensure its long-term availability in quantity and quality. This is recognised by the NWA through the provision of an integrated approach to water management. This approach is characterised by decentralised decision-making and allows all water stakeholders to participate in water management in their prospective catchments. The overall aim is to arrive at a single strategic plan for a specific catchment. However, it appears that the principles of equity, efficiency and sustainability in water distribution still remain hard to achieve, especially, since there have been delays in the establishment of the key sector institutions such as CMAs.

South Africa requires policy instruments that are suitable for planning and enable enhanced cooperation and integration between various water stakeholders that impact on the water resources, considering the nature of water. Most importantly, these integrative policy instruments should be practical to such an extent that they are brought into everyday use, in order to provide immediate solutions where required, such as in the agricultural and mining sectors. Integrative policy instruments should be designed in such a manner that they allow the enhanced participation of the local stakeholders and civil society at large in managing their catchments. In addition, integrative policy instruments should enable external coordination between various catchments and even outside South Africa, considering the heterogeneity in the spatial distribution of water.

The NWA made provision for the integrative policy instruments in the form of the NWRS and the CMS. It seems like only the NWRS has yet partially served its purpose of being an integrative policy tool, although, only two editions have been published to date, with the second edition published in June 2013 instead of 2009. There are only two CMSs (for the Breede and Inkomati CMAs) developed for the two WMAs out of nine, as most CMAs

have not been established yet. Ideally, the NWRS has to inform the CMS and the two must function as integrative entities in such a way that National Government uses the NWRS to regulate and monitor water management and local government, on the other hand, has to follow the CMS as a guide to manage water management at catchment level.

In order to facilitate the effective implementation of the NWA, the integrative policy instruments should not only be good and all-encompassing in theory, but should also be practical on a daily basis. Overall, this calls for more research on the existing, as well as other integrative instruments aiming at the facilitation of implementing the NWA. Furthermore, such research needs to acknowledge the links between water resource management and water services through the existing links between the NWA and the WSA, as demonstrated in Figure 2.2, *viz.* the Water and Sanitation Business Cycle.

3. BACKGROUND TO THE STUDY AREA AND METHODOLOGY

The aim of this study is to examine the likely reasons associated with the lack of water policy implementation and to investigate integrative instruments for the effective implementation of the National Water Act of 1998. The study also needs to acknowledge the challenges involved in establishing integrative policy instruments.

The research objectives for this study are as follows:

- to identify integrative policy instruments for the implementation of the National Water Act;
- to identify major constraints and challenges affecting the process of the implementation of the National Water Act;
- to examine suggestions proposed by the relevant stakeholders (both institutional and local) in relation to the major constraints and challenges affecting the effective implementation of the National Water Act; and
- to acknowledge the important links between the National Water Act (NWA) and the Water Services Act (WSA).

This chapter aims at providing a description of the research methodology that was undertaken, in order to satisfy the stated aim and objectives of the study. This study was undertaken based on a case study, in order to provide an insight into the current and future water resource management and water services issues in South Africa. This was also considered in order to enable the researcher to gain the deeper understanding of the water management issues in SA, using a case scenario. Basing the research project on a case study also enabled the researcher to get a better understanding of the links between the two main water Acts that guide water resource management and water services in SA (this was also the fourth objective of the study).

In this study, the Mgeni Catchment was chosen as the case study and was therefore the main focus of the study, with one minor exception made with regard to one of the selected communities. This exception will be explained in more detail later in this chapter. The background to the case study under investigation and the methodology that was undertaken in conducting the study, are described in the sections to follow.

3.1 Case Study Used for Investigation: the Mgeni Catchment

For the purpose of this study, the Mgeni Catchment has been chosen as the best catchment to suit the proposed investigation, based on its ecological and socio-economic characteristics. The Mgeni Catchment is currently facing the increasing demand for water challenges that are linked to urbanisation, agricultural, urban and industrial development. Moreover, although the Mgeni Catchment is comprised of a catchment management plan and has the associated water management initiatives in place, such as CMFs, these do not seem effective and sufficient to solve the current and future water management challenges facing this Catchment.

Hence, in order to plan beforehand and to derive the best possible solutions, this Catchment has been chosen as the study area for the proposed research on integrative policy instruments for the implementation of the NWA. It should be noted that, even though the study will be concentrated in the Mgeni Catchment, the outcomes of this investigation can also be applied in other catchments, due to the nature of the research problem.

The Mgeni Catchment comprises an area of approximately 4387 km^2 and is one of South Africa's most developed catchments supporting agricultural and industrial development and it therefore contributes to a significant percentage of South Africa's Gross National Product (GNP) (Tarboton and Schulze, 1991; Jewitt and Kotze, 2000; Schulze *et al*., 2004; Archer, 2006). The Mgeni Catchment is home to about 45% (3.5 million) of the population of the KwaZulu-Natal Province (Stat SA, 2011). Currently, the water engineered system within the Mgeni Catchment consists of four main dams, namely, Midmar, with a supply capacity of 237 million m^3, supplying mainly Pietermaritzburg and parts of Durban, and the Albert Falls, Nagle and Nanda Dams, with a relative supply capacity of 289 million m^3, 23 millionm^3 and 242 millionm^3, respectively, supplying the City of Durban (Jewitt and Kotze, 2000; Summerton, 2008; Warburton *et al*., 2010). In addition, there are more than 300 farm dams within the Catchment, supplying water for 18 500 ha of irrigation (Summerton, 2008; Warburton *et al*., 2010). The Inter Basin Transfers from the Mooi River, with further transfers planned for the Mkhomazi River, are currently the water resources supplementing the Mgeni system (Jewitt and Kotze, 2000; Archer, 2006; Umgeni Water, 2010). However, recent studies reveal that the Mgeni is a relatively stressed system with the high possibilities of additional stream flow reduction activities i.e.

forestry, predicted for the future (Summerton, 2008; Warburton *et al*., 2010). The reason behind this potential increase in stream flow reduction activities is directly associated with the rapidly growing demand for water resources and services, stemming from increased population, urban and agricultural development and the lack of knowledge of how development and land cover changes impact on the quantity and quality of water resources (Tarboton and Schulze, 1991; Warburton *et al*., 2010).

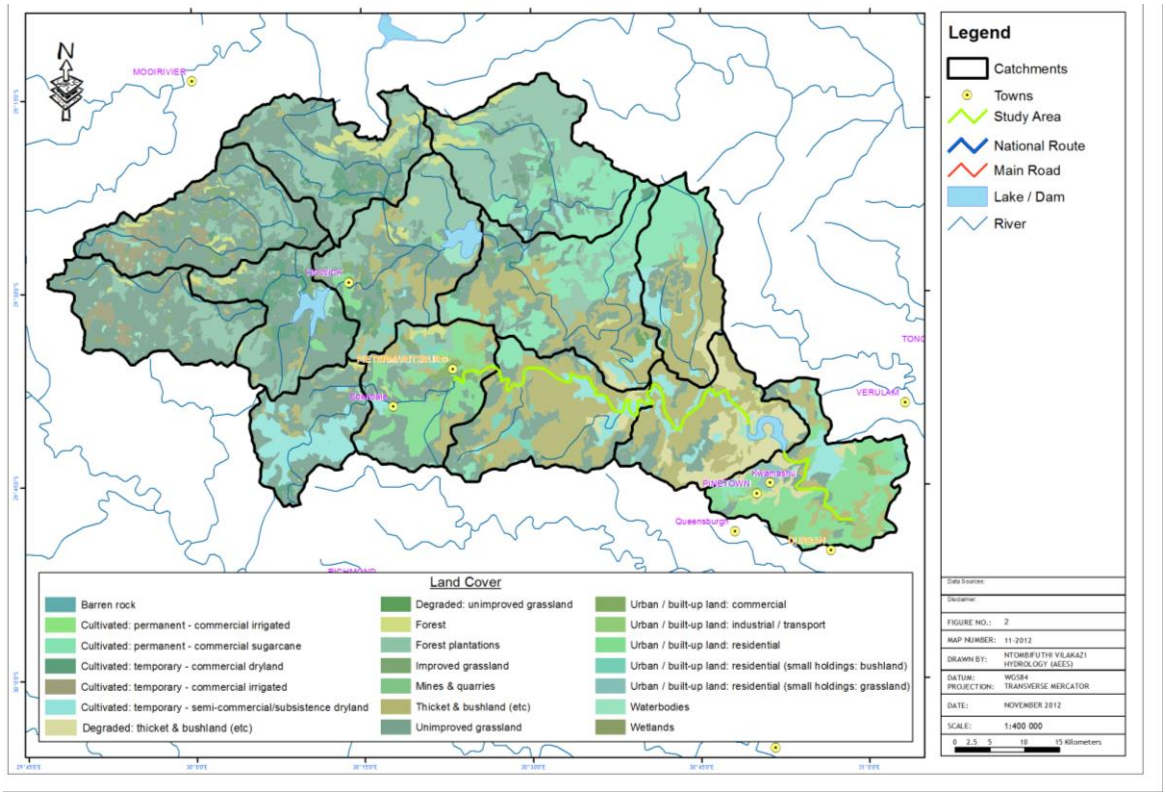

Figure 3.1 The Mgeni Catchment

The Mgeni Catchment Management Plan (MCMP) and the Mgeni Catchment Management Forum (MCMF) were established in response to a major need to manage water resources holistically and to ensure sustainable water resource management in this Catchment. However, these do not seem to be sufficient to solve the current and future challenges facing water resource management, as well as water services in this Catchment.

The Mgeni Catchment is especially relevant as a research area for this study, as the demand currently exceeds the available yield and is predicted to worsen in the near future. This calls for more attention to be paid to the management of its water resources. In addition, although the existing participatory activities (CMFs) are insufficient, they are suitable for the objectives of this study. These include examining the water resource

management and servicing delivery issues that are associated with the lack of water policy implementation in the Mgeni Catchment.

3.2 Research Methodology

This study was conceptualised and undertaken using a mixed research method. Mixed research can be defined as research studies that involve 'mixing or combining quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study' (Collins *et al*., 2006 p. 69). Particularly, this study utilised the combination of qualitative and quantitative methods and approaches, in order to allow for the accumulation of more richer and elaborate data and to enable the assessment of different components of this study. This type of research was also specifically chosen over other methods, in order to enable participant enrichment, instrument fidelity and significance enhancement, which is explained further in Step 3 of the framework that was undertaken in the study. Mixing was also done, in order obtain thicker and richer data for the interpretation of the results with confidence and to enable the convergence of the findings.

This study was conducted using the framework developed by Collins *et al*. (2006). Their framework for mixed research involves thirteen (13) methodological steps that are grouped within three stages:

1. **Formulation Stage**: (1) determining the mixed goal(s) of the study; (2) formulating mixed research objectives; (3) determining the rationale for the study and the rationale(s) for considering mixing approaches; (4) determining the purpose of the study and the purpose(s) for mixing quantitative and qualitative approaches; and (5) determining the research question(s);
2. **Planning Stage**: (6) selecting the sampling design; (7) selecting the mixed research (methods) design; and
3. **Implementation Stage**: (8) collecting quantitative and/or qualitative data; (9) analysing the quantitative and/or qualitative data; (10) validating the [mixed] research findings (11) interpreting the mixed research findings; (12) writing the [mixed] research report; and (13) reformulating the [mixed] research question(s).

The following sections and pages will explain the different steps under each stage for this study.

3.2.1 Formulation Stage

Step 1: Aims of the mixed research study

The goal(s) of the present mixed research study have already been developed in the beginning of this chapter .e. to examine the reasons associated with the lack of the implementation of the NWA and to investigate the integrative policy instruments for implementing the NWA.

Step 2: Objectives of the mixed research study

The objectives of this mixed research study are in line with the aim of the study and are also listed in the beginning of this chapter and include:

- identifying integrative policy instruments for implementation of the National Water Act;
- identifying major constraints and challenges affecting the process of the implementation of the National Water Act;
- examining suggestions proposed by the relevant stakeholders (both institutional and local) in relation to the major constraints and challenges affecting effective implementation of the National Water Act; and
- acknowledging the important links between the National Water Act (NWA) and the Water Services Act (WSA).

The rationale behind the formulation of these was to enable planning for the project to shape and to present the primary focus of the study.

Step 3: Rationale for mixing methods

The rationale for mixing quantitative and qualitative methods was derived from Collins *et al.*'s (2006) Rationale and Purpose (RAP) model, which is a model that incorporates the comprehensive rationale and purpose for conducting mixed research method studies. This model helps in facilitating the design and in the implementation of the methodologically strong studies. The rationale for mixing includes four themes:

- Participant enrichment i.e. recruiting or targeting participants that are responsible for water management and services at institutional and local level and ensuring that each participant selected is appropriate for inclusion (Collins *et al.*, 2006);
- Instrument fidelity i.e. using quantitative and qualitative data to develop

questionnaires (Collins *et al.*, 2006); and

- Significance enhancement i.e. collecting both qualitative and quantitative data to obtain thicker and richer data than would otherwise have been obtained, using only one type of data (Onwuegbuzie and Leech, 2004; Benge and Onwuegbuzie, 2010).

Step 4: Purpose for mixing

The purposes for mixing qualitative and quantitative methods in this study were complementarity in the sense of using quantitative and qualitative techniques to measure the many aspects of a water management in the Mgeni Catchment, resulting in more richer and elaborate data, triangulation in the sense of mixing quantitative and qualitative methods to ensure that different viewpoints are captured in the study, and expansion in the sense of using both quantitative and qualitative methods to increase the breadth of the study, to ensure that various points of view are captured, as well as to ensure that the different components of water management in the Mgeni Catchment are assessed (Benge and Onwuegbuzie, 2010; Onwuegbuzie and Collins, 2007).

Step 5: Research hypothesis (research questions)

The formulated research hypothesis of the study is that the effective implementation of the NWA will be achieved with the proper establishment of integrative policy instruments and through building the required capacity in various water institutions. This hypothesis was tested through:

- formulating relevant research questions;
- purposively selecting a sample consisting of water managers (water key-informants) in various departments, including civil society; and
- comparing what was being observed in a sample, to what was expected to be observed if the hypothesis was true.

The questions guiding this study represented mixed research questions and are presented below:

Research questions

Because of the nature of the aim and objectives of the study, the formulated research questions targeted two different groups of participants namely, the key-informants, representing the water resource management part of the study and the household informants, representing the water services side of the study.

Based on the project aim and objective, a set of 10 research questions were developed, including two main research questions (one for each group) and the two sets of specific research questions (differentiated according to each group of participants), which were all pertinent to mixed research methods, in that they either sought to quantify a variable, tended to relate one variable to another, sought to gain an insight of a respondent on the issues at stake, or tended to combine or mix both the quantitative and qualitative research questions (meaning they required both quantitative and qualitative data to be collected and analysed).

The **main research question** for the key-informant group was: Is the challenge of implementing the National Water Act in South Africa a result of a lack of, or slow establishment of relevant integrative instruments for implementation, and can the same instruments be shared by the different management levels?

This research question was formulated with the purpose of achieving Objectives 1, 2 and 3 regarding integrative policy instruments for the implementation of the NWA, the major constraints associated with the poor implementation of the NWA and the key-informant's suggestions in relation to the perceived major constraints in the implementation of the NWA. This question is also partially relevant to Objective 4 in terms of the major constraints associated with achieving the objectives of the NWA.

Specific research questions for the key-informant sample group were:

1. What are the integrative instruments for policy implementation of the NWA?
2. What are the perceived constraints to the implementation of the NWA?
3. What are the key informant's suggestions in relation to major constraints?
4. What is the prevalence of each of the perceived constraints?

5. How do the perceived major constraints relate to each other?
6. Does the National Government ensure monitoring, evaluation and learning for the process of water policy implementation, and if yes how, and how is the overall water sector involved in this process?

It should be noted that even though all these research questions were covered in the key-informant interviews, Questions 4 and 5 are more suited for a quantitative survey approach as they are both specific. (RQ4 seeks to quantify responses on one variable and RQ5 tends to relate one variable to another). For Questions 1, 2, 3 and 6 the qualitative approach is the best method for gaining full insight into the issues at stake. Though this is the case, the questionnaire was designed in such a manner that both qualitative and quantitative approaches were given equal weight i.e. each question had options to choose from, in order to ensure that the survey stay focused on getting the answer that is required (close-ended). However, in order gain full insight into each issue that is being assessed (especially in a qualitative research question), space was provided for a respondent to explain further (open-ended).

The **main research question** for the household informant group was: Is the level of water service delivery the same between high- and low-income households/communities? This research question was aimed at obtaining data relevant to the fourth objective of this study, specifically in relation to the Water Services Act.

Specific research questions for the household sample group were:

7. What is the household level of satisfaction with water services received between different income groups?
8. What are the perceived barriers to improved water service delivery in low-income communities?
9. How do communities or households contribute to water management (at community and household level)?

Notably, research Question 7 is more suited for a quantitative approach (as it seeks to quantify one variable), whereas for Questions 8 and 9 qualitative approach is the most suitable method to obtain the respondent's full insight into the matter being assessed. Though this is the case, the questionnaire was designed in such a manner that both the qualitative and quantitative approaches were given equal weight i.e. each question had

options to choose from, in order to ensure that the survey stay focused on getting the answer that is required (close-ended). However, in order to gain full insight into each issue being assessed, space was provided for a respondent to explain further (open-ended).

Furthermore, an integrative research question was formulated in order to bring together the data from the two different groups and also two different research designs (key-informant interviews and household surveys) that were undertaken for primary data collection for the study. The **integrative research question** was:

10. How do water resource management (NWA) and water services (WSA) relate to each other?

The rationale behind the formulation of the integrating research questions was to acknowledge the existing links between the targeted research groups for data collection (key-informant participants representing water resource management in the Mgeni Catchment and household participants representing water services or supply in the Mgeni Catchment) and what they essentially represent i.e. NWA and WSA.

Participants and setting

The key-informant interviews were aimed at achieving the first three objectives, and partially the fourth objective of the study regarding water resources management in the Mgeni Catchment. By definition, "key informant interviews are qualitative in-depth interviews done with individuals who are experts on a particular topic" (UCLA, 2005, p. 1). The rationale for using key informant interviews was to ensure obtaining data with regards to water resources management, from a wide range of people, including community leaders, professionals, and residents. These are usually the individuals who have the first-hand knowledge about the topic of interest. Moreover, these experts, with their particular knowledge and understanding of the topic, can provide insight on the nature of problems and give recommendations for solutions (UCLA, 2005).

The participants included in this group were 13 key-informants, which consisted of the officials from the Department of Water Affairs, Department of Agriculture and Environmental Affairs, eThekwini Water Services, uMgungundlovu District Municipality, NGOs, such as Gearsphere, Imvula Trust, Dusi Umgeni Conservation Trust (Duct), parastatal organisations, such as Umgeni Water, community councils and academic

researchers on water issues. At a local level, key informants were ward councillors. These key informants were also invited to attend a workshop later in the study.

The household surveys, on the other hand, were aimed at achieving the fourth objective of the study, which examines and acknowledges the links between the NWA and the WSA and therefore requires data on both water resource management and water supply. Due to the increasing demand for detailed socio-economic data for households and individuals in developing and transitioning countries like South Africa, household surveys have become an important and dominant method for collecting information on populations in developing countries (UN, 2005). Household surveys were seen as the best method for collecting data on the issues of water service in the Mgeni Catchment, because they constitute a central and strategic component in the formulation of policies (UN, 2005).

Specifically for this study, the household surveys were multi-purpose and integrated in nature and designed to provide reliable data on a range of demographic and socio-economic characteristics, as well as the accessibility to water services. It should also be noted that the household surveys in this study were designed in such a manner that the data collected through them can be used as indicators to inform and monitor water services and the associated policy development. The participants were 40 households from four different selected communities, namely, Noshezi, Hayfields, Zwelibomvu and New Germany. The selection of the study areas will be discussed later in this section.

3.2.2 Planning stage

This stage comprises of Steps 6 and 7, which included selecting the sampling design and selecting the mixed research design.

Step 6: Mixed research sampling scheme

Due to the fact that all 13 key-informants and 40 household participated in both quantitative and qualitative phases of the study, and the quantitative (closed-ended questions) and qualitative data (open-ended questions) were collected simultaneously, the type of mixed sampling design used was a Concurrent Sampling Design, where both the research approaches *viz.* quantitative and qualitative approaches, were given equal weight (Benge and Onwuegbuzie, 2010; Onwuegbuzie and Collins, 2007).

Step 7: Mixed research design

Using the Benge and Onwuegbuzie (2010) research typology, this study was categorized as a fully mixed concurrent design because of the following:

- quantitative and qualitative research methods were mixed or combined within several stages of the investigation process, namely, the data collection, data analysis and data interpretation stages;
- the original quantitative and qualitative data were gathered and analysed concurrently; and
- both the quantitative and qualitative phases were treated approximately equally.

This mixing research design is supported and suggested by various previous research studies. By combining multiple methods, researchers can hope to overcome the investigation weaknesses such as bias and the problems that come from a single method (Benge and Onwuegbuzie, 2010; Onwuegbuzie and Treddlie, 2003).

Sampling strategy

Different sampling strategies were utilised in selecting the key-informant and household informant groups. These were applied in the selection of cities, individual key-informant participants, study areas and individual household participants. The details of the sampling strategies, selection processes, as well as the rationale behind the type of sampling strategy, are provided as follows:

Selection of cities

The study adopted a purposive sampling strategy for the selection of cities. This type of sampling is a non-probability sampling technique, whereby a researcher makes a decision about whom to choose and he or she selects those who are best-suited for the purpose of the study purpose (Bailey, 1994). Specifically in this study, the City of Durban (hereafter referred to as DBN) and the City of Pietermaritzburg (hereafter referred to PMB) were selected, based on their interesting characteristics such as their geographic location in relation to the Mgeni River System, where the City of PMB is located near the source of the Mgeni River and the City of DBN is located near the mouth of the Mgeni River. Furthermore, these two cities are major urban centres situated within the Mgeni Catchment and therefore play significant roles in influencing the increase in water demand in the

Mgeni Catchment (Umgeni Water, 2011). The policy instruments in the Mgeni Catchment include Catchment Management Forums. Even though these entities are not statutory bodies, they play a significant role in ensuring cooperation between various water departments that impact on water resources and they also ensure the continuous monitoring of water management in the Mgeni Catchment.

Of most interest to the study in relation to the key-informant interviews is the fact that water to both these cities is supplied by the Mgeni Catchment. Therefore it means both these cities will have to strengthen their water management strategies, in order to overcome the water management issues that are likely to intensify with the expected increase in the demand for water, stemming from economic development and the associated population increase in both these cities. On the other side of the coin, of most interest to the study in relation to the household survey is that both the cities of DBN and PMB comprise of both low-income and high-income households, which are supplied water services by the water service authorities and providers that form part of the Mgeni Catchment Management Committee or forum, which operates in both cities.

Selection of key-informant participants

Thirteen key water informants were purposively selected between PMB (6) and DBN (7) as key informants for the study's primary data collection. The purposive sampling was utilized to include the stakeholders utilizing and managing the Mgeni Catchment because the rationale behind this was to target only those key-informants that hold a stake in water management and those that are familiar with water management issues in the Mgeni Catchment.

Notably, it could be argued that the sample of 13 participants used in the study was not a true representation of all the key water informants from the Mgeni Catchment. However, as the data collection method catered for the sample representative factor, this should not be a problem. The chosen stakeholders were chosen based on the position they hold and the experience they have in the water sector. Most of them held management and directorate positions and had more than five years' experience in their prospective positions, hence representing a high level of expertise and knowledge. In this case, sample size (13) is not important because of the value and quality of the information that accumulates from such individuals (key-informants). A sample of 13 was therefore seen as

a representable sample, judging from the level of information and knowledge that would accumulate from such high level of expertise of the stakeholders.

Selection of study areas/communities

Four prospective study areas were purposefully selected between PMB and DBN for household data collection. The main reason for selecting the study areas between PMB and DBN has already been stated in the chosen case study section. In addition both these cities comprise of both low-income and high-income communities. Therefore it was interesting to compare the social equity issues in terms of water supply between these cities. It was also interesting for the study to compare the level of satisfaction of the different social households between these cities with the aim of coming up with better strategies to improve both water management and water supply in the greater Mgeni Catchment. However, it should be noted that the rationale behind studying the water-related social issues at household level is to enable the achievement of the fourth objective of the study. The fourth objective of the study is to acknowledge the links between the NWA and WSA and to fulfil the Sanitation Business Cycle, in order to achieve 'effective water governance'.

The four study areas included Hayfields, Noshezi (both located in PMB), New Germany and Zwelibomvu (both located in DBN). Two of these four areas were rural or semi-rural and low-income areas (Noshezi and Zwelibomvu), while the other two were urban and high income areas (Hayfields and New Germany). The rationale behind using a purposive sampling method was to ensure that the target population (low- and high-income households) of the study is included in the study, in order to enable the assessment of social equity issues in terms of both water management and supplying both the chosen cities for the study.

The Mgeni Catchment was the main focus of the study, with one minor exception made for the Zwelibomvu, area which geographically falls just outside of the Mgeni Catchment. This exception was made for various reasons, including the fact that it met the criteria of being a low-income, semi-rural area within the eThekwini Municipality. It seemed feasible to make this exception, especially because there are few rural areas within eThekwini Municipality area of the Mgeni Catchment. Making this exception also seemed beneficial to the study in terms of saving time, money and energy, while travelling.

Even though the Zwelibomvu area geographically falls outside of the Mgeni Catchment, it is being serviced with by water from the eThekwini Municipality and Umgeni Water, which are the two major water service providers in the Mgeni Catchment.The next section will discuss the strategy that was used when selecting households for the actual data collection.

Selection of individual households

Before the actual data collection, each of the four study areas was visited in order for the researchers to familiarize themselves with the area and in order to gather the information about who in the community has water and who does not. It was found that, for both low-income study areas (Noshezi and Zwelibomvu), a certain percentage of the households did not have water supply. It was noted that the community members that have water supply, experience a number of water-related social issues. The community members that did not receive a water supply were purposefully included in the sample, since they were a population of interest to the study. The interval random sampling method was applied to the households that have a water supply in their homes, in order to ensure that every member of the population had an equal chance to be included in the sample. Altogether, 20 households were selected in the low-income study areas.

All members of the community in the high-income study areas (Hayfields and New Germany) did have a water supply, although it was mentioned that it is common to find houses that have their water cut off (because the owners can no longer afford to pay). All the households in high-income areas were selected according to their street, using interval random sampling. The rationale behind using this type of sampling method was to allow various households in the community to be included in the sample and to have an equal chance to voice their opinions regarding the water service and overall water management in their communities.

The interval or systematic random sampling is a probability sampling technique where the nth person, starting with a person randomly selected from among the first nth person, is selected. Using this type of sampling, each household in the chosen study area had the same chance of being selected and to be part of the study's population sample.

The Systematic random sampling strategy was also used in the study, in order to increase a

sample's statistical efficiency, to gain a broad presentation of respondents within each study area and to allow for various household's perceptions and level of satisfaction towards water service and management in the Mgeni Catchment. Altogether, 20 households r were selected in the high-income study areas which made a total of 40 households selected for this study's data collection (both PMB and DBN were evenly represented).

3.2.3 Implementation Stage

This stage comprises of Steps 8-13 which are described as follows:

Step 8: Collecting the data (data sources)

Data for the study was generated, using both secondary and primary data sources. Initially, a broad range of information in the form of secondary data was sourced and used in the background and literature review of the study. The review of current and past literature provided an informed understanding of the context of water governance and issues that are associated with water policy implementation. Furthermore, the reviewed literature provided a starting point for further exploration of the participatory activities in the Mgeni Catchment (this made the process of selecting participants easier). The consulted secondary data sources for this study included books, accredited academic journals, reports, newspaper articles, electronic journals, conference papers, databases, government communications and legislation, internet sites, interviews and other published literature.

The review of current and past research studies on water governance allowed for appropriate questions to be formulated for both sample groups. Primary data on the other hand, was sourced from face-to-face interviews with key-informant water stakeholders and from face-to-face surveys with households in the selected study area within the Mgeni Catchment. An additional workshop was later held with some of the key-informants, in order to present the key-findings of the study.

Collecting the data: instruments

Two separate data collection instruments were used for primary data collection from the two sample groups. For, key informant interviews a key informant research questionnaire (**Appendix A**) was used. This consisted of both open-ended questions (what are your

suggestions in relation to the major constraints associated with the lack of implementation of the NWA?) and closed-ended questions (Which of the following do you think forms the most relevant integrative instruments for water policy implementation of the NWA?). The key-informant questionnaire was pre-tested by using pilot test with two key-informant participants who did not form part of the 13 sample.

Similarly, for household surveys, a household research questionnaire (**Appendix B**) was developed for collecting data from the four (4) selected study areas. This also consisted of both open- ended (Are you satisfied with the quality of water that you get from the main source and if not, what are the quality problems that you come across with?) and closed-ended questions (What is the main source of drinking water used by the household (with options given)?. The household questionnaire was pre-tested by using a pilot test in Matikwe at iNanda area and the questionnaire was refined on the basis of the results of the pilot test.

During the survey, the researcher ensured that the ethical integrity of the respondents was maintained. The details for the ethical treatment of the household will be discussed in details in Section 3.4. Challenges were encountered during data collection and these will be highlighted in the section on limitations and challenges of the study (Section 3.5).

Pilot Test

For both the research sample groups a pilot test was done to test the research questionnaires, in order to detect weaknesses in questionnaire design and to provide proxy data for the selection of a probability sample. Notably, the questionnaires were tested/piloted by simulating the actual field conditions to assess the respondents understanding of the style and format, as well as the questions, and to monitor the time taken to complete the interview. The pilot tests results revealed that, for both research questionnaires, some questions were ambiguous and the interviews were taking too long to complete. Some questions were then reformulated and some were excluded from the questionnaire so as to reduce the time it takes to complete one questionnaire. It should be noted that the data collected from the pilot tests was not taken into consideration for the study's data analysis.

Collecting the data: procedures

In collecting the data, for the key informant group the participants were contacted via emails and cell-phone in the months of April and May 2011. Initially, seventeen participants were invited via email to voluntarily participate in the interviews. The email sent to them also included an informed consent form (**Appendix C**) as an attachment, which they had to sign for ethical consideration purposes. Thirteen of the seventeen that were invited, responded and agreed to participate in the study. Arrangements were then made to set-up the date and venue of the interview. Most key-informants were interviewed at their work offices, while others were interviewed at their homes and few at venues of their preference such as, coffee shops and restaurants. Before each interview, each participant signed an informed consent form, indicating that they participated voluntarily in this research project. The informed concern form also gave the respondents the option to stay anonymous, should this be preferred.

For household surveys, the ward councillors from the four selected study areas were notified about the research that was to be undertaken in their community. All participants were interviewed in their homes. Before each interview, each participant signed an informed consent form, indicating that they participated voluntarily in this research project. The informed concern form also gave the respondents the option to stay anonymous, should this be preferred.

Step 9: Data analysis (sequentially mixed analysis)

A Sequential Mixed Analysis (SMA) (Onwuegbuzie and Teddlie, 2003; Benge and Onwuegbuzie, 2010) was conducted to analyse the data collected through both key-informant interviews and household surveys. This analysis involved the use of both quantitative data and qualitative analysis procedures in a sequential or consecutive manner, specifically commencing with quantitative analyses, followed by qualitative analyses that built upon the quantitative analyses, and then followed by quantitative analyses of the qualitative data. Oscillation between inductive reasoning and deductive reasoning in the research method enabled abductive reasoning on the sequential analysis used in the study (Morgan, 2007). The SMA consisted of four stages that comprised descriptive, exploratory or confirmatory analyses:

Descriptive analysis

For the key informant group the first stage involved performing descriptive analysis in SPSS for all the quantitative data that was collected, using closed-ended tables from section A to F of the key-informant questionnaire (Appendix A). This analysis helped in obtaining the answers for the main research question (RQ), as well as for RQs 1 and 6.Similarly, for the household survey group, the first stage involved an SPSS descriptive analysis of the quantitative data that was collected using closed-ended questions i.e. the demographic profile of the respondents, the source of water in each household and the level of household satisfaction with the water supplied to them. The descriptive analysis stage provided answers for RQ 1 and the main RQ.

Exploratory analysis

For the key informant group, this stage involved an exploratory analysis to examine the participant's major constraints associated with the lack of the effective implementation of the NWA, while for the household group it involved examining the household's perceived barriers to improved water supply in low-income communities. For both groups, this process, modified from Benge *et al*. (2010) analytic methodology, and included the following:

- understanding the collected data through reading repeatedly all the participants' written words, phrases and sentences, in order to become familiar with them;
- separating participant's responses into parts, in order extract non-over-lapping significant statements and eliminating repetitions;
- focusing the analysis through formulating meanings and by explaining the meaning of each significant statement; and
- categorising information into themes or patterns from formulated meanings, with each theme consisting of units that were considered to be similar in content. In that way, each theme is unique.

The research questions that were answered in this stage involved RQs 2, 3 relevant to key informants and RQs 7 and 8 relevant to household group.

Exploratory analysis: quantification of qualitative data

This stage involved obtaining the prevalent rate for each of the identified themes in Stage 2 for both groups. The prevalent rates were measured according to the number of times that each theme was mentioned alone or with other themes, by both groups during the interview or survey (the number of participants that provided a response that fell into a particular theme). The results obtained from this stage provided answers to RQs 4, 7, 8 and 9 respectively.

Exploratory analysis: correlation analysis

For the key informant group, an extra exploratory analysis was conducted and involved using the prevalent rates for each theme, to form an inter-respondent matrix table of themes, in order to conduct a hierarchical cluster analysis to examine the relationship between the identified themes (RQ 5). The analysis was told to include a dendongram plot and the Wards method was specified. This method is different from other methods (nearest neighbour, furthest neighbour and between groups), because it uses an analysis of variance approach to evaluate the distances between clusters and aims to join cases, in order minimise variance within clusters. To do this, each case begins as its own cluster. When using the Ward's method two clusters are merged if a merger results in the minimum increase in the error sum of squares (Field, 2000).The output of the analysis included an agglomeration table, which provides a solution for every possible number of themes from 1 to 8 and a dendogram, supporting the table showing three clear clusters.

Step 10: Validating/Legitimating the findings

Just like most/all research findings, for both data collection, groups it was recognized that threats to descriptive validity (i.e. accuracy of results), interpretive validity (i.e. researchers' representations of the participants), internal validity (e.g. instrumentation/questionnaire) and external validity exists (Onwuegbuzie, 2003; Benge and Onwuegbuzie, 2010). In considering the limitations of this study, the researcher used the research typology outlined by Onwuegbuzie and Johnson (2006) to address legitimation types in mixed research. Specifically, in order to maximize the sample integration legitimation, identical samples were utilised for both the qualitative and quantitative approaches. Inside-outside legitimation was enhanced by capturing both

participants' quantitative and qualitative data, as well as comparing the two. Incorporating household surveys in the research facilitated the integration of insider and outsider perspectives. Weakness minimization legitimation was improved by integrating descriptive accuracy (i.e. obtained from the qualitative analyses) with empirical accuracy (i.e. obtained from the quantitative analyses). Paradigmatic mixing legitimation was enhanced by using a fully mixed research design (Leech and Onwuegbuzie, 2009; Benge and Onwuegbuzie, 2010), as well as by undergoing all major steps of the mixed research process outlined throughout this chapter. Multiple validities legitimation was enhanced by using the RAP model to optimize participant enrichment, instrument fidelity (using quantitative and qualitative data to develop a questionnaire) and significance enrichment (collecting a combination of qualitative and quantitative data to obtain richer data than otherwise would have been obtained, using only one type of data). Nevertheless, despite the rigorous nature of the research design, replications of this study are needed to assess the reliability of the current findings.

Step 12 and 13: Writing the mixed research report/ reformulating the mixed research question

The mixed research report (Step 12) is incorporated in its entirety in this dissertation, which considers the recursive nature of mixed research and leads to the re-formulation of the research questions (Step 13). Future research might consider addressing the following questions: What is the relationship between the sectors ability to implement policies and the perceived major constraints? Which perceived constraints predict the level of perceived difficulty in policy implementation?

3.3 Integrative Research Question for Integration of the Undertaken Data Analysis on Two Different Groups

For the integrative research question, key-informant data analysis results were integrated with results from the household data analysis. Specifically, Stages 2 from both analyses were integrated i.e. key-informant's concerns about future water management in the Mgeni Catchment were categorised and assigned into relevant themes. The accrued themes were carefully observed and it was discovered that the themes were cyclic or mutually linked to each other and represented the links between water resource management (NWA) and water services (WSA).

The integrative research was also answered through integrating the data analysis results that were obtained from Stage 2 of the key-informant group data analysis on the perceived major constraints of the implementation of the NWA, with the results of Stage 2 from the household data analysis on the perceived barriers to improved water supply in low-income households. Again, through the careful observation of the results from both analyses, it was discovered that the results were related to each other i.e. the constraints of the effective implementation of NWA (lack of institutional capacity) were similar to those of the barriers to improved water service delivery (financial constraints and poor community leadership).

All research questions were answered. The data analysis results for both groups were presented in tables and figures in Chapter 4. The next section will now present the ethical treatment of the respondents during data collection for both key-informants and household surveys.

3.3.1 Ethical Treatment of Respondents

Research must be designed in such a manner that respondents are protected from suffering any physical harm, pain, discomfort, embarrassment or loss of privacy just because they agreed to participate (Cooper and Schindler, 1998). Hence for this study, ethical clearance was applied for and granted by the Humanities & Social Sciences Research Ethics Committee at the research office in Westville Campus.

One of the requirements for ethical clearance was the informed concern form, to ensure ethical consideration of the participants of the study during data collection. For both, sample groups, an informed consent form was designed (see **Appendix D**), to ensure that the participants participate voluntary in the study. The informed concern form was also designed for assuring the participants that, their anonymity or confidentiality will not be disclosed to anyone if they wish so.

Prior to the commencement of each interview (for both key-informant interviews and household surveys), it was clarified to the participants that:

- their participation is voluntary and that they may not answer questions which make them feel uncomfortable;
- they are free to stop the interview at any point, if they do not want to proceed;

- no names and addresses were required as part of the research survey; and
- the interview will only proceeded, provided that the potential participant verbally agreed to participate in the study.

3.4 Workshop

A workshop was conducted on 17th July 2012 at the University of KwaZulu-Natal as part of the study, with the aim of presenting and discussing the results of the study with key-informants interviewees.

This was a combined workshop between a Water Research Commission Project K5/1965 led by Mrs Sabine Stuart-Hill (also the supervisor of this research project), together with Professor Roland Schulze, and this Masters Project on water policy implementation.

Moreover, as expected from collective thinking, more ideas were stimulated at the workshop. These provided more information, from which to make conclusions as well as recommendations (cf. section 5.2). However, it should be noted that no quantifiable information was accumulated from the workshop and, hence there are no further reports on it.

3.5 Limitations and Challenges of the study

The following limitations and challenges associated with the fieldwork of the study were identified:

- the fieldwork was planned to take place in March 2011, but only started in mid-April, due to the application for ethical clearance from UKZN which had to be granted first, before data collection;
- getting the key-informants to participate in the study was partially challenging, due to their many commitments; and
- the theme of the interview was sensitive to some key-informants. Hence, they chose not to participate at all, or preferred to remain anonymous.

It should be noted that the mentioned limitations were properly managed and hence, did not prevent the study from achieving it objectives.

3.6 Conclusion

This chapter presented the research methods that were used in this study in order to achieve the stated research objectives. A secondary data literature search on past and present studies was conducted, to establish a contextual and background understanding of water governance and policy implementation. The mixed research design consisted of primary data, which was collected using the interviewer completed empirical surveys of 13 water stakeholders and 40 households from designated study areas in the Mgeni Catchment. The research (target) population, the sample size and the sample procedures used were established and discussed. In addition, the methods used to collect the data were described, as well as the roles of research ethics and the ethical treatment of respondents, which was important, to maintain the ethical integrity of the study were discussed. The data analysis methods that were used as well as the presentation of the findings were clarified. Finally, the limitations of the study clarifying the parameters of the research were noted at the end of this chapter *viz*. Chapter3.

4. RESULTS AND DISCUSSION

The most important part of policy development and policy reform is the implementation phase, as this is the actual proof of policy reform. This is why this dissertation investigates whether the National Water Act (Act No. 36 of 1998) provides relevant and implementable water management strategies as integrative policy instruments for its implementation. The literature review (*viz.* Section 2.4) suggests that the development and application of these policy instruments has not been effective to a level that was envisaged by the NWA. The slow establishment of the sector reforms, especially with regards to the CMAs, defeated the purpose of some of the key elements and policy instruments for reforming the water sector, such as the implementation tool, the Catchment Management Strategies (CMS). The main concern with regards to the available instruments for policy implementation of the NWA is that, they are currently used in isolation from each other (i.e. NWRS used without a CMS) and the links between them are overlooked. The associated risk with this is that implementers and practitioners may lose sight of a broader perspective of how the various components fit together logically. In addition, the NWA prescribes adequate representation of all stakeholders as the most important factor in its implementation. However, this factor has not yet been achieved, since some stakeholders, especially the poor, are rarely given the opportunity to express their opinions of water management in their prospective Catchments areas.

It should be noted that the results of the inquiry are divided into two sections, namely, water resource management in the Mgeni Catchment and water supply in the Mgeni Catchment, since research data was purposively obtained from two different sample groups, using different questionnaires. The level of water management was also considered differently *viz.* the results obtained from one sample group were concerned with water resources management in the catchment, while the other group results were concerned with the actual water supply at a local level. The results from the two separate sections will be integrated in the final conclusion (*cf.* Section 5.3) at the end of the dissertation.

I. Water Resource Management in the Mgeni Catchment

This section presents the results of the data that was collected, using key-informant interviews. It should be noted that the results reported in this chapter are presented following the research questions that were formulated at the beginning of the study and laid out in Chapter 3, Section 3.2.1, Step 5.

It should also be noted that the views expressed in these results are the provincial views, as the majority of the interviewees are from local and regional level.

4.1 Integrative Instruments for Policy Implementation of the NWA

This section reflects the participants' general understanding of integrative policy instruments (RQ1: What are the integrative instruments for policy implementation of the NWA?). This question was analysed using descriptive statistics (quantitative approach), in which a descriptive analysis was performed in SPSS on the data that was collected quantitatively. Table 4.2 indicates that the key-informants had a similar understanding of integrative policy instruments. The majority of the participants (10/13) understood integrative policy instruments as the policy tools that allow and enhance greater cooperation between various water stakeholders.

Table 4.1 Key-informant understanding of integrative policy instruments

Definition	**Frequency N=13**
Combining policy instruments that allow greater cooperation and integration between water stakeholders i.e. CMFs	8
Instruments that allow different departments to work together i.e. DWA and DEA	2
Instruments like blue drop, green drop and catchment management agencies	2
Instruments that recognize the link between the NWA and WSA or Where you have different policies joined together e.g. catchment management forums create a stakeholder platform where both water resource management and water services issues are discussed.	1

Two out of thirteen of the stakeholders indicated that integrative policy instruments were like those of the Blue and Green drop systems and Catchment Water Management Agencies, integrating both the water services management and water resource management dimensions in South Africa.

Only 1/13 stakeholders indicated that integrative policy instruments are policy measures that recognise the existing links between the NWA and WSA. One example of such an instrument, given by one key-informant, was the NWRS. It was mentioned that though most WMAs do not yet have the CMS in place, ideally the NWRS is aimed at informing the CMS for each of the WMAs, thereby integrating the national government with the local government in order to ensure that everyone is on the same page and working towards the same goal of effectively managing water resources countrywide.

4.2 Participant's Rating of the Identified Policy Instruments

When the key-informants were asked to rate the integrative policy instruments that were initially identified through the desktop studies (*viz.* Appendix A, Section E, Question 5.2), according to their importance, 12/13 of them rated the combination of all general instruments for policy implementation (technical, legal, institutional, social/participatory, economic and administrative policy instruments), with the National Water Resource Strategy and the Catchment Management Strategy as the most integrative policy instruments, but only when established and applied together.

Table 4.2 Identified instruments for implementation of the NWA

Policy instrument	**Frequency** **N=13**
NWRS	1
Comb of general policy instruments, NWRS and CMS	12
Total	13

4.3 The Sharing of Integrative Policy Instruments

In relation to the main research question, whether the identified integrative policy instruments can be shared equally amongst different management approaches *viz*.

Centralised, Decentralized, IWRM and AM), all 13 interviewees answered 'no' and specified that the integrative policy instruments can only be shared amongst the management approaches that have the same objectives i.e. decentralised, IWRM and AM, and not amongst the management approaches that are contradictory to each other i.e. the objectives of a centralised approach (no sharing of responsibility and public participation in water management) are contradictory to those of a decentralised management and IWRM approaches (sharing of responsibility and public participation in water management). It should be noted that this question was analysed through descriptive statistics (quantitatively) and the data was collected quantitatively (closed-ended questions).

Table 4.3 Policy Instruments for Implementation of Various Water Management Approaches

Policy instrument	Centralisation	Decentralisation	IWRM	AM N=13
Combination of general policy instruments (integration of all the general policy instruments (technical, legal, institutional, social/participatory, economic, and administrative policy instruments	1	2	3	5
Enforcement Mechanisms	9	0	1	0
NWRS	8	7	7	5
CMS (CMAs, CMFs, CMCs and WUA) and other participatory related instruments	1	11	11	11
"We do not need this approach we only need DWA to monitor and regulate"	8	0	0	0

Table 4.4 demonstrates that, according to the interviewees, the NWRS (8/13) and Enforcement Mechanisms (9/13) function at their best in a centralised water management

framework, while the CMS is judged as performing best in a more decentralised (11/13), integrated (11/13) and adaptive (11/13) water management framework.

Interestingly, more than half (8/13) of the participants strongly emphasised the belief that a centralised approach to water management is not needed in the South African policy context. They expressed that this approach complicates the water management process, as it contradicts the endeavours of decentralisation, and likewise for IWRM and AM. Instead, the participants expressed that the centralised approach should only come into play in the format of the regulatory, monitoring and oversight functions of the national government.

4.4 Major Constraints Associated with the Lack of Implementation of the NWA

In relation to RQ2 (What are the perceived constraints to the implementation of the NWA?), a total of eight emerging themes were identified with regards to the perceived major constraints for implementing the NWA:

- lack of institutional capacity (skills, human and financial resources);
- lack of integrative policy instruments;
- lack of integration;
- inadequate water infrastructure;
- limited monitoring/learning/evaluation;
- wrong mind-set/thinking/attitude; and
- lack of political will and lack of clearly defined roles and responsibilities.

This research question was analysed using a qualitative approach, where an exploratory analysis modified from Benge *et al.* (2010) was followed i.e. understanding the collected data, data separation to extract overlaps and to eliminate repetition, formulating meanings and categorising data into themes).

Table 4.5 presents these eight major constraints to the effective implementation of the NWA. Interestingly, the lack of institutional capacity was the highest rated theme, with nearly all but one participant (i.e. 12/13) providing a response that fell into this category. This was closely followed by the lack of integrative policy instruments (8/13) and the lack of integration between water stakeholders and other government departments (6/13). Inadequate water infrastructure was found to be a major constraint by 30.8% of the participants. The monitoring, learning and evaluation theme followed, with 23.1%. The

lowest relevance, i.e. 2/13, was given to all the themes of wrong mind-set/attitude, lack of political will/commitment and lack of clearly defined roles and responsibility.

Table 4.4 Major Constraints to Effective Implementation of the NWA

Theme/Constraint	Frequency	Formulated meaning	Sample Participant Statement N=13
Institutional Capacity	12	All institutional capacity related constrains including Human resources, skills shortage, financial resources that affects the proper functioning and competence of water institutions.	*"lack of dedicated people with passion for water and environment in the water institutions"* *"there is insufficient funds to cover water management issues"* *"There is shortage of skills specially in the hydrology and engineering disciplines"*
Integrative Policy Instruments	8	Ineffective and lack of establishment of the available integrative policy instruments	*"we need to establish the CMAs so they develop the CMS in their designated WMAs"*
Integration	7	Lack of integration between water stakeholders and between different government departments.	*"the main problem is lack of integration between water stakeholders themselves and also between DWA and other government department"*
Water Infrastructure	4	Lack of or insufficient water infrastructure	*"Water infrastructure is a huge problem especially in rural areas".*
Monitoring, Learning and Evaluation	3	Limited monitoring, learning and evaluation of the water policy implementation process	*"There is little monitoring and evaluation of the implementation process"* *There is no formal guideline for monitoring and evaluation of the implementation of the NWA".*
Thinking/attitude and Mindset	2	Thinking, attitude and mindset of water stakeholders towards water management responsibility.	*"Thinking and mindset of the water stakeholders is a biggest constraints"* *"DWA needs to change their mind-set and decentralize water management responsibility to the appropriate level".*
Roles and Responsibilities	2	Confusion of roles and responsibilities.	*"There is no clear definition of roles and responsibilities in water institution and as a result there is often confusion and duplication of functions".*
Political Will	2	Lack of political will or political authority / commitment to enforce implementation of the NWA.	*"I personally think that the department is just not yet willing and committed to making the implementation of the NWA happen".*

4.4.1 Relationship between the major constraints associated with the lack of implementation of the NWA (RQ5)

Through, careful observation during data categorisation, it was discovered that various themes had a tendency to occur together repetitively i.e. whenever, one theme was stated the other one would also be mentioned. It was then decided that some of the identified connections suggested some form of causal relationships and therefore, for enhancement and confirmation of the relationship between the themes, a hierarchical cluster analysis

was performed to determine both the relationship and the distance of the relationship between the themes.

It should be noted that this research question was analysed, using the quantification of qualitative data i.e. the data that was collected qualitatively was categorised and after identifying trends between various variables, it was decided that a cluster analysis would be the best analysis to be undertaken, in order to detect where the relationships lie.

Figure 4.1 presents a dendogram, demonstrating both the relationship between the identified major constraints and the distance of such a relationship.

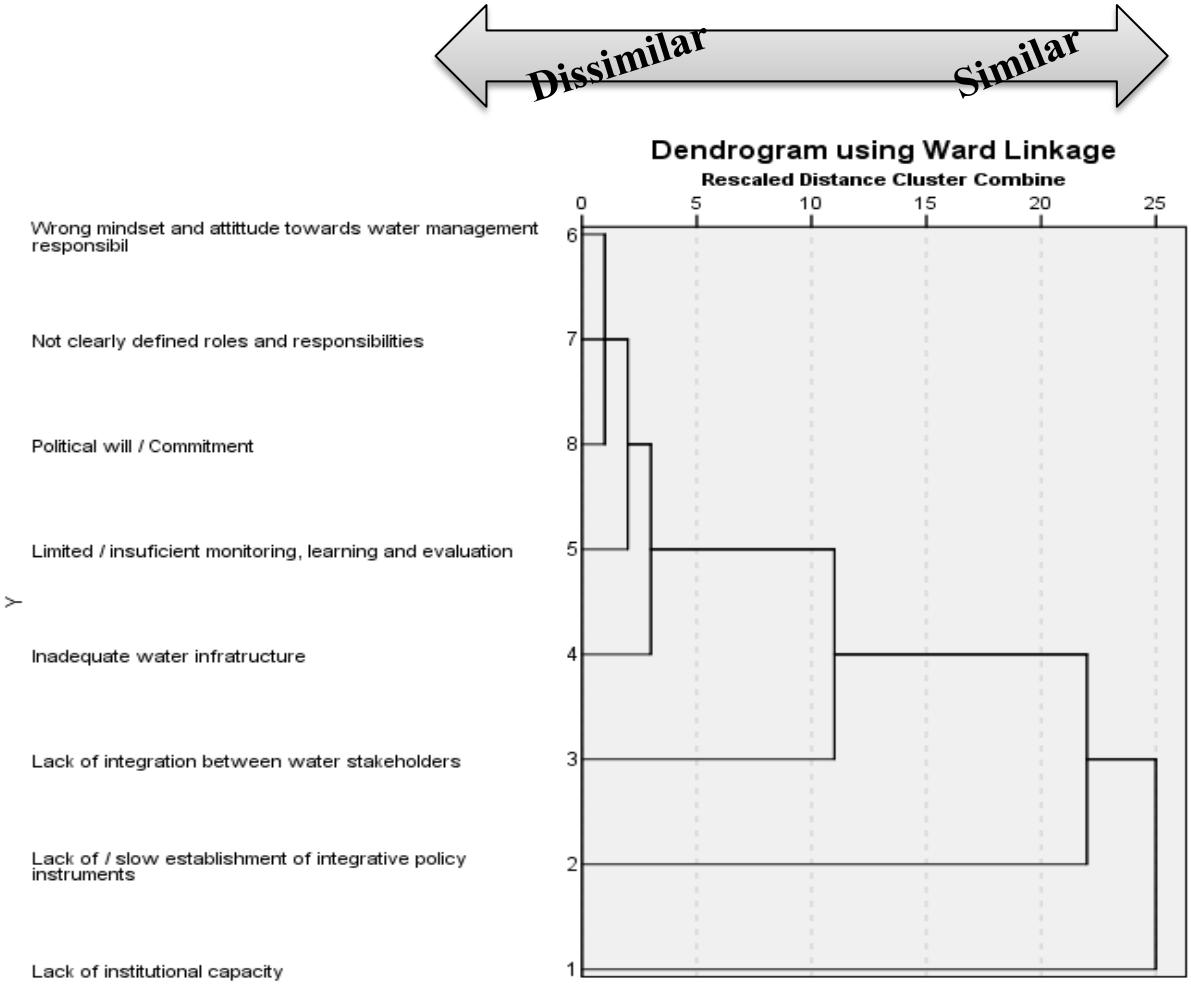

Figure 4.1 Dendogram demonstrating both correlation and the distance of the relationship between the perceived major constraints to the implementation of the NWA

From Figure 4.1, it can be clearly observed that all the clusters are interlinked and that the level of similarity between them decreases with the height of the horizontal lines in the figure 4.1 (the longer the line, the greater the difference). These lines represent the similarity coefficient, which is the level of similarity between the themes.

Figure 4.1 shows that Themes 1 and 2 are the most similar in the dendogram and therefore form their own, and longest, cluster, respectively in the dendogram), with a similarity coefficient of 7.867 (Appendix D: Agglomeration Table). The second most relevant cluster in the dendogram is in the case of Themes 2 and 3 (second longest cluster in Figure 4.1), with a similarity coefficient for this cluster being 4.653.

The third most relevant cluster is the case of Themes 3 and 4. With a similarity coefficient of 1.948, they form the third longest cluster in the dendogram. All other similarity coefficients were less than one and have hence, been discarded for further analysis.

4.4.2 Suggestions in overcoming the identified major constraints

Table 4.6 presents a number of suggestions given by the participants in relation to the perceived major constraints (RQ3: What are the key-informant's suggestions in relation to major constraints?) This research question was analysed using a qualitative approach, where an exploratory analysis modified from Benge *et al*. (2010) was followed i.e. understanding of the collected data; separation of the data to extract overlaps and to eliminate repetition; formulating meanings and categorising data into themes).

For the institutional capacity constraints, almost all of the participants i.e. 12/13 suggested that "capacity building mechanisms such as training of staff in water institutions should be employed". It was also suggested that the recruitment departments need to ensure that only the right people are employed for the right positions and furthermore, that it must be ensured that the water budget is allocated to water-related expenses.

Another significant majority of the participants, viz. 10/13, who had identified integration as one of the major constraints, suggested that this constraint can be overcame by employing an integrated, holistic and an inter/trans/multi-disciplinary approach whenever dealing with water management. With regards to the lack of integrative policy instruments, 7/13 of the participants suggested that the CMA establishment in KwaZulu-Natal must be fast-tracked, as this will enable the development of a CMS which will enhance local

stakeholder participation and hopefully allow for equity, sustainability and efficiency in water allocation at the catchment level. The participants also suggested that attendance and participation of local stakeholders of the CMFs should be encouraged and that decision-making should be done collectively between the key stakeholders, taking into consideration the views of civil society.

Relating to the monitoring, learning and evaluation constraint, half the key-informants *viz*. 7/13 of the key-informants suggested that the National Government must develop a guideline for the monitoring and evaluation of the implementation process of the NWA itself. In order to enable learning, the stakeholders suggested the National Government should constantly conduct research surveys in order to investigate whether the anticipated outcomes of the implementation process of the NWA are achieved or not. Furthermore, it was suggested that the monitoring and evaluation of the implementation process of the Act should be continuous, to allow for improvement of the implementation process where required and also to enable learning from the previous mistakes of the implementation process. The key-informants further suggested that DWA should engage in joint social learning processes of all sectors influencing water management.

In relation to the constraint 'lack of water infrastructure', the interviewees suggested a strong focus on establishing the required water infrastructure, especially in rural areas. The participants also highlighted that existing water infrastructure should be well maintained i.e. identifying and fixing leaks, in order to avoid future water restrictions that might result from such water loss.

With regards to the wrong mind-set and attitude constraint, the key-informants suggested that the water stakeholders need to change their attitude and mind-set towards water management responsibility and understand that water management is everyone's responsibility. The participants further suggested that people must understand their direct and indirect impact on water resources, and hence, that water management is every SA citizen's responsibility. Last, but not least, the suggestion was made to delegate water management more to the catchment or regional level, as envisaged in the NWA (1998) and NRWS (2004).

Pertaining to the constraint 'lack of political will', the interviewees (2/13) recommended that the DWA should use their political power and authority to enforce the implementation

of the NWA. The participants also mentioned that the DWA needs to put more effort and commitment on fast-tracking the implementation of the NWA through the establishment of the CMAs.

Table 4.5 Suggestions in Relation to Major Constraints N=13

Major constraint	**Frequency**	**Theme /Suggestion**	**Formulated Meaning**	***Sample Participant Statement***
Institutional Capacity	**12**	○ Capacity building measures / mechanisms ○ Employing the right people for the right positions ○ Strengthen human resources ○ Allocate more budget to water management	○ Employ capacity building mechanisms and place the right people in the right positions ○ The challenge lies in employing dedicated people with passion for the environment and for water. ○ Improving human resource development to produce effective workforce ○ use water budget in water related issues allocate more financial resources in different institutions	"*Water institutions needs mechanisms for capacity building such as training of staff"* *"The department needs to employ/hire right people for the right positions"* *"There is need to strengthen human resources for water management"* *"The water sector needs to use water budget to water related activities and nowhere else."*
Integrative policy instruments	**8**	○ Establish CMA ○ Develop CMS ○ Participation of local stakeholders ○ Enforcement mechanisms ○ Collective decision making	○ There is need to carefully plan and strategize the available integrative policy instruments to enable their proper establishment i.e. NWRS, CMAS, CMFs and CMS ○ Delegate implementation responsibilities to catchment level i.e. CMAs ○ Encourage more participation of local people in CMF's ○ There is need strong enforcement mechanisms ○ There is need to encourage collective decision making;	*"Need for carefully planned integrative policy instruments with a clear strategy"* *"Establish CMA's and them up and running"* *"CMAs to develop CMS"* *"Delegate implementation responsibilities to local level CMAs"* *"Encourage more participation of local people in CMF's"* *"Need strong enforcement mechanisms"* *"Encourage collective decision making"*
Integration	**6**	○ Integrated approach ○ Stakeholder participation ○ Holistic approach ○ Interdisciplinary, multidisciplinary and trans-disciplinary approach	○ There is need to employ an integrated approach to water management ○ There is need to encourage active stakeholder participation in water related programs i.e. CMFs ○ There is need to encourage a holistic approach to water management ○ There is need to employ an interdisciplinary, multidisciplinary and trans-disciplinary approach to water management.	*"we have to employ an integrated approach to water management"* *"We need to encourage active stakeholder participation in in water related programs i.e., CMFs"* *"We need to encourage a holistic approach to water management"* *"We need to employ an interdisciplinary, multidisciplinary and trans-disciplinary approach to water management"*
Lack of Water Infrastructure	**4**	○ Develop and establish required water infrastructure ○ Prevent future water restrictions through maintaining water infrastructure. ○ Identify and fix leaks ○ Lifespan of water pipes	○ There is a need to develop and establish the necessary water infrastructure ○ There is need to take the right precaution measures to prevent future restrictions in water usage ○ Focus on fixing leaks to avoid wastage of water ○ Implement mechanisms for water demand management ○ Calculate and extend the life span of water pipes	*"the water sector needs to develop and establish the necessary water infrastructure especially in rural areas"* *"we have to take the right precaution measures to prevent future restrictions in water usage"* *"we needs to focus on fixing leaks to avoid wastage of water"* *"we need to implement mechanisms for water demand management"* *The water sector needs to calculate the life span of water pipes"*

Monitoring, Learning and Evaluation of the implementation process	**3**	○ Develop guidelines for monitoring and evaluation ○ National Government to continue conducting research surveys to investigate whether the anticipated outcomes of implementing the NWA are achieved or not and evaluate and improve the process of implementation where required and also learn from the previous mistakes. ○ Social learning processes i.e. communities of practice ○ Interactive awareness to allow learning ○ Water education ○ Develop a knowledge-based water economy	○ There is need for DWA National to develop guidelines for monitoring and evaluation ○ There is need for NG to constantly conduct surveys to investigate whether the implementation process of the NWA is effective or not. ○ There is need for more stakeholder platforms that enable learning by doing such as communities of practice. ○ There is Need for interactive awareness to ensure learning ○ There is need to encourage water education countrywide ○ Need for on-going monitoring and evaluation of the implementation process to institute what is working and what is not, as well as taking lessons from other countries counties experience; ○ Need for mitigation and adaptation measures against the impacts of climate change	*"Every sector should be represented in a social learning process in order to allow for enhanced cooperation hence enhanced learning.* *"We need to educate people about implications of climate change i.e., Need to encourage rain water harvesting at household level as alternative source of water" "Need to implement alternative methods to save water such as human compost and bi-digest toilets in new developments"* *"There is Need for interactive awareness in the form of art or stage plays to ensure learning"* *"There is need to encourage water education at schools and through media"* *"Need for on-going monitoring to establish what is working and what is not, as well as learning from effective practices in selected countries"* *"Need for mitigation and adaptation measures against the impacts of climate change"*
Thinking, Attitude and Mind-set of water stakeholders	**2**	○ Change mind-set/attitude and thinking of water stakeholders	○ Huge need for change in thinking, attitude and mind-set of water stakeholders through cogeneration of knowledge	*"Water stakeholders needs to change their mind-set and attitude towards water management responsibility"* *"DWA needs to change it mind-set and attitude in terms of decentralizing or delegating implementation responsibilities to the appropriate level"*
Lack of political will / Commitment	**2**	○ Political commitment and support to establish the anticipated sector reforms	○ The national Government needs to use it political power/authority to establish the anticipated sector reforms	*"DWA National needs to use it political power to enforce the anticipated sector reforms thereby facilitating the implementation of the NWA"* *"DWA needs to put more effort and commitment and come up with ways to facilitate the implementation process".*
Lack of clearly defined roles and responsibilities	**2**	○ Clear definition of roles and responsibilities	○ There is need for clear definition of roles and responsibilities in the water sector	*"The water sector needs to use the NWA as a guide to clear definition of roles and responsibilities where possible".*

4.5 Indicators of Limited Monitoring and Evaluation of Implementation of the NWA

Research Question 6: Does the National Government ensure monitoring, evaluation and learning for the process of water policy implementation, and if yes, how, and how is the overall water sector involved in this process? was analysed quantitatively, using the data collected quantitatively through the Likert Scale. The results showed that the majority (7/13) of the stakeholders strongly agreed (3/13) and agreed (4/13) with the statement. Moreover, the participants who agreed and disagreed with the statement also indicated that monitoring and evaluation of the implementation process is one of the barriers associated with the slow implementation of the NWA. On the other hand, a lower number (5/13) of the participants indicated that they disagree and mentioned that "there is monitoring and evaluation of the implementation process to a certain extent, even though it is not enough".

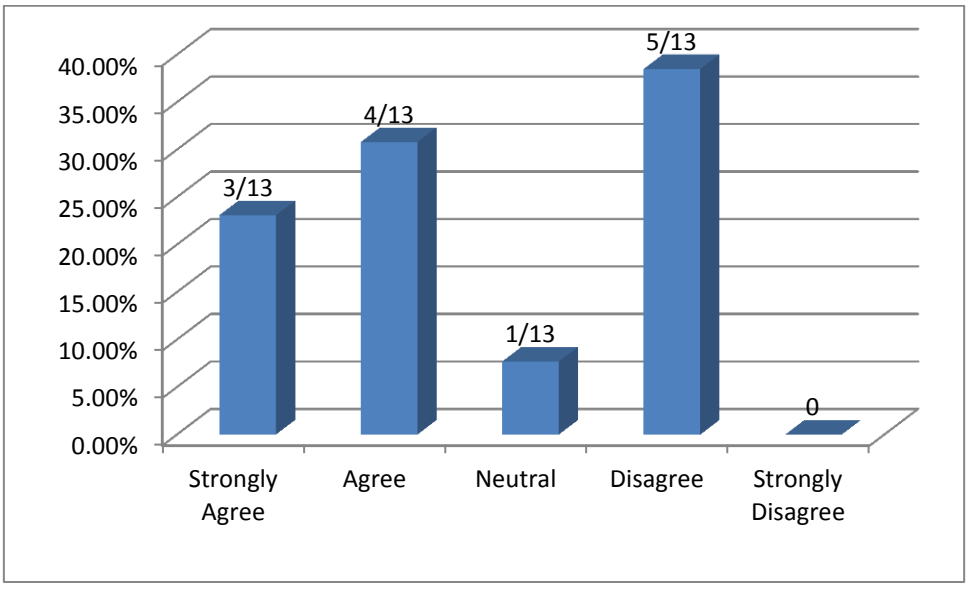

Figure 4.2 Stakeholders' level of agreement with the non-existence of effective monitoring and evaluation of the implementation of the NWA

In addition, in relation to the research question, which enquired whether or not the national government does monitor the implementation of the NWA, the DWA key-informants (4/13) indicated that monitoring and evaluation is the National Government's responsibility. They also specified that, even though there is monitoring and evaluation of the implementation process to a certain extent, it is not formal and sufficient, since there is not yet formal document that guides the processes of monitoring and evaluation of the implementation of the NWA. The rest of the interviews (8/13) indicated that there is

monitoring and evaluation of the implementation process of the NWA, but it is not enough and it is not properly done, as there is no scope that is assigned to it.

In addition, it should also be borne in mind that limited monitoring, learning and evaluation was mentioned by a third of the key-informants as one of the major constraints in the implementation of the NWA. Therefore this serves as an indication that the monitoring and evaluation of the implementation process of the NWA is inadequate.

4.6 Discussion of Key Findings

The initial aim of the study was to examine possible reasons associated with the lack of policy implementation and to investigate integrative instruments for the effective implementation of the National Water Act and the associated challenges in the establishment of the policy instruments.

This section, therefore, discusses the results that were obtained from analysing the data that was collected through key-informant interviews.

4.6.1 Identified integrative policy instruments

The results in relation to the first research question, which was on integrative policy instruments (Table 4.3), are in agreement with the desktop studies which shows that integrative policy instruments for the implementation of the NWA include the general instruments for policy implementation, such as the technical, institutional, economic, legal, administrative and participatory instruments, the NWRS, as well as the CMS. These results are also consistent with the assertions of Plummer and Slaymaker (2007) that the technical, institutional, economic, legal, administrative and social/participatory tools are the policy instruments for effective water governance.

Notably, the participants mentioned that there are more than enough policy instruments for the implementation of the NWA in the SA water sector. However, the main concern is that the available policy instruments are not integrated themselves and as a result, they are not achieving their initial goal of enhancing cooperation between water stakeholders and other government departments. These results are aligned with previous research and have provided relevant answers to the research questions of the study (RQ 1).

In addition, in relation to these results, Dent (1998) and du Toit *et al*. (2011) advised that an integrated approach needs to be employed when applying policy instruments in managing water-related matters.

4.6.2 Perceived major constraints of the implementation of the NWA

The results in relation to the second research question on the perceived major constraints towards the effective implementation of the NWA, showed that the most important major constraints include the lack of institutional capacity (financial and human resources), the lack of integration between water stakeholders and between the water sector and various government departments, the lack of or slow establishment of integrative policy instruments and the limited monitoring, learning and evaluation of the implementation process.

The constraint of 'institutional capacity', including both the lack of financial resources and human resources in water institutions, was the most highlighted (12/13) by the participants. These findings are in line with the assertions of various studies (Mackay and Rogers, 2000; Plummer and Slaymaker, 2007; Anderson *et al*., 2008; Medema *et al*., 2008; Tissington *et al*., 2008; Iza and Stein 2009; UNDP, 2012) that governability or the competence and ability to implement water policies requires human and financial resources for activities associated with both water resource management and water supply. These studies also clearly show that the lack of management capacity of water institutions is a major barrier in implementing national water policies.

Also in line with these results are the assertions of Naster and Hansen (2009), that South Africa is not capacitated with specialists with water resources skills i.e. there is a shortage of water engineers, hydrologists, implementers and compliance monitors at the DWA (and in other departments related to water management) and a high number of vacant positions will most likely be found in these fields, when looking at the government department's circular. This clearly indicates that there is a significant lack of human resources in South Africa's water institutions. In addition, Naster and Hansen (2009) state that the resignation of many experts, such as scientists and practitioners and their move across to private consultancies, is very common in the DWA and this has resulted in the degradation and loss of institutional memory in the water sector.

The second mostly highlighted (8/13) theme by the participants was the lack of and/or, the slow establishment of integrative policy instruments. With regards to this theme, the stakeholders specified that the NWA does make provision for the implementation of integrative policy instruments, namely the NWRS and the CMS. However, the main issue here is that these instruments have not yet been effective, as there are currently serious delays in their proper establishment and functioning i.e. the key informants were concerned that:

(a) The first edition of the National Water Resource Strategy was developed in 2004, but was not effectively established and there were also concerns that it took forever (nine years) for the second edition of the NWRS to be completed, while it was supposed to be renewed in a five-year cycle.

(b) No Catchment Management Strategy has been developed for most of the water management areas, since the process of the establishment of CMAs has been longer than anticipated. With regards to this reasoning, the stakeholders expressed that it has proven to be very difficult to develop a CMS, since the power to manage water resources and implement policies has not been fully delegated to the appropriate levels i.e. the DWA regional have not been authorized by the National Government to take decisions. The participants also emphasized that the national government should be responsible for developing policy and not implementing it. Implementation should be the DWA regional's responsibility i.e. the DWA national should concentrate on regulating, giving oversight and monitoring the whole process of the NWA implementation.

(c) Catchment Management Forums are functional, but most of them are not yet designed for public participation, as the local stakeholders are poorly represented in the meetings. The key-informants also emphasized that even if the local stakeholders attend the meetings, they rarely benefit from these meetings because they do not understand the scientific terms being used in these meetings. Furthermore, language is also a barrier to these stakeholders because some of them have a limited understanding of English or they do not understand it at all, while most of the CMFs meetings are conducted in English (Karrar and Seetal, 2000; Simpungwe, 2003; du Toit and Pollard, 2008).

The above results agree with other studies on the policy implementation of the NWA (Naster and Hansen, 2009; DWA, 2011; Movik and de Jong, 2011). They are eye-opening and provide significant information on the way forward and what improvements can be made.

The results with regards to the current status of the CMS and CMFs are consistent with du Toit *et al*. (2007), that, while CMFs are intended to be more than platforms where water stakeholders defend their interests in water resources, South Africa has not yet implemented an all-inclusive and practical approach to stakeholder engagement at the catchment level (WMAs). Furthermore, du Toit *et al*. (2007) referred to the CMS as the basis for public engagement and in that way recognizes the direct link between the proper functioning of the CMFs and the development of the CMS i.e. once the CMAs have been established and once the CMS has been developed, stakeholders will then be able to plan for water security through engaging in strategic planning on water security.

The Lack of integration between waters stakeholders themselves and also between the water sector and other government departments, was the third most highlighted theme *viz.* 6/13. These results are consistent with Rahaman and Varis (2005) and Naster and Hansen (2009), that one of the major problems of implementing the NWA is centred on the lack of integration, so that there is a poor level of co-operation and 'togetherness' between various government departments and water stakeholders. This is, however, in contrast with the constitutional mandate that "all organs of state must co-operate with each other in mutual trust and good faith by co-ordinating their actions and legislation with each other" (Dent, 2009).

Dent (2009) adds that the most important aspect of integration between water stakeholders and among various departments is the fact that water is a shared resource and is directly linked to other natural resources and, therefore, cannot be managed without taking consideration of other natural resources. Thus, this means that effective water management and policy implementation can only be achieved if the dynamics of water, and how it is related to other natural resources, is understood and acknowledged.

Inadequate water infrastructure and the limited monitoring, learning and evaluation of the implementation process of the NWA were also identified as major constraints to the implementation of the NWA, but with a lower frequency of 4/13 and 3/13, respectively.

With regards to the inadequate water infrastructure constraint, the interviewees specified that water infrastructure is specifically a crucial issue in rural areas. These results are consistent with UNDP (2007), that inadequate water infrastructure has generally prevented improved water services supply to domestic consumers, and especially, to the poor. In most urban areas, population growth has placed immense pressure on water resources, to such an extent that the existing water infrastructure now urgently requires redesign and upgrading.

In relation to the 'monitoring, learning and evaluation constraint', the key-informants indicated that the monitoring and evaluation of the implementation process of the NWA itself is limited. Furthermore, they also indicated that the absence of a formal guideline for monitoring and evaluation might be the reason behind the current shallow monitoring and evaluation process. The current state of the process of monitoring and evaluation of the implementation process of the NWA is in contrast to the suggestions of Abram (2000) in the Water Resources Management Reform Process Paper. In this paper, the author recommends that every implementation process should be accompanied by continuous monitoring and evaluation, in order to ensure that implementation remains a continuous process and also to make sure that the sector learns from the previous mistakes. In order to demonstrate this, Abram used a governance cycle, which clearly shows that the implementation phase is part of a cyclical process, indicating that it is non-stop, but continuous.

This implies that more work still needs to be done on the monitoring and evaluation side of the implementation process of the NWA.

Interestingly, the results also showed that there is strong support from the reviewed literature (Folifac, 2006; UNDP, 2007; Plummer and Slaymaker, 2007; Iza and Stein, 2009; Naster and Hansen, 2009; du Toit *et al*., 2011; DWA, 2011; Nkondo *et al.*, 2012) for the argument that the hindrance of effective implementation is based on a lack of political commitment and a lack of clearly-defined roles and responsibilities. However, the key-informants rated this issue very weakly, with only 2/13 participants mentioning it.

4.6.3 Relationship between the perceived major constraints

with regards to the relationship between the perceived major constraints, the analysis revealed that all the major constraints to the effective implementation of the NWA are interrelated with a lack of institutional capacity, a lack of or slow establishment of integrative policy instruments and the lack of integration between different sectors related to water management, which area the most similar or related themes. The results of the analysis also proved to be true in reality because, according to the reviewed literature, institutional capacity is a component of integrative policy instruments. Hence inadequate institutional capacity results into a lack of and/or the slow establishment of integrative policy instruments depicting, a cause and effect relationship between the two (Plummer and Slaymaker, 2007; DWA, 2011).

Moreover, these results are also practical in reality and are consistent with the recent studies on integrative policy instruments (DWA, 2011; du Toit *et al.*, 2011; NWRS; 2013). These studies reveal that, more than anything else, integrative policy instruments are meant to be increasing the level of cooperation between water stakeholders and other government departments. This means that the slow establishment of integrative policy instruments results in poor co-operation between water stakeholders and other government departments, thereby hindering effective water management (the cause and effect relationship).

4.6.4 Participants' suggestions in relation to major constraints

Table 4.6 in the results section listed all the suggestions proposed by the participants in relation to the identified major constraints. In relation to the highest rated constraints of the lack of institutional capacity, the key-informants suggested building this, by incorporating relevant training courses in various water institutions.

The key-informants suggested that the following must be taken into consideration:

- to employ capacity-building mechanisms and place the right people in the right positions, by employing dedicated people with a passion for water and the environment;
- to use the water budget in water-related expenses and allocate more financial resources in different institutions;

- to carefully plan and strategize the available integrative policy instruments to enable their proper establishment i.e. NWRS, CMAS, CMFs, CMS;
- to fast-track the establishment of the CMA and delegate implementation responsibilities to catchment level i.e. CMAs;
- to employ an integrated approach when dealing with water management issues;
- to employ the inter-disciplinary, multi-disciplinary and trans-disciplinary approach to water management, in order to ensure co-operation between water stakeholders and stakeholders from all disciplines; and
- to encourage active stakeholder participation in water-related programs i.e. CMFs.

These suggestions by the participants correspond with some of the recommendations from other studies (MacKay and Rogers, 2000; Al-Eryani, 2002; Batchelor, 2007; Naster and Hansen, 2007; Wagener *et al*., 2010; Woodwill, 2010 du Toit *et al*., 2011; Kondo *et al*., 2012) and present an opportunity to implement good change in the water sector in terms of policy implementation.

These proposed suggestions by the stakeholders are in line with various recommendations forwarded by previous studies (Naster and Hansen, 2009; du Toit *et al*., 2011; DWA, 2011; Kondo *et al*., 2012) regarding the way forward for the implementation of the NWA.

4.6.5 The level of sharing of integrative policy instruments among the water management approaches

The overall key-informant results can be used to provide an answer to the main research question, which enquired whether the lack of implementation of the NWA results from the lack of integrative policy instruments. The results show that the answer is 'yes', considering the perceived major constraints. The ineffective or lack of integrative policy instruments was the most highlighted theme as the main cause of poor implementation of the NWA (taking into consideration that the institutional capacity is a policy instruments on its own), in the sense that there is only one existing integrative policy instrument (the NWRS) operating in isolation of the not yet developed other integrative instrument of the NWA (CMSs in most WMAs). Moreover the general policy instruments, such as economic, institutional, legal, administrative, technical and participatory instruments also need to be treated integratively, in order to obtain better implementation results.

These results, together with the findings of the previous research, support the initial hypothesis of the study that the poor implementation of the NWA results from ineffective integrative policy instruments and water institutional capacity. These results have in many ways clearly shown that the delayed development and establishment of the CMSs and the associated CMAs (Tables 4.3 and 4.5) are the main problems associated with the poor implementation of the NWA and therefore the study's hypothesis is rejected.

The second part of the main research question queried whether or not integrative policy instruments can be shared by different management approaches. The results (Table 4.3) provided evidence that integrative policy instruments can only be shared amongst the management approaches that have the same objectives i.e. decentralised management, IWRM and AM, and not amongst management approaches that are contradictory to each other i.e. Centralised Management contradicts Decentralised Management, as well as IWRM and AM approaches.

For example, the results indicated that the NWRS and the enforcement mechanisms function best in a centralised water management framework. Contrarily, the CMSs perform best in a more decentralised, integrated and adaptive water management framework.

The participants of the study felt that the reality of the NWRS is functioning on its own in most water management areas, without a CMS, is an indication that the SA water sector still operates in a more centralised water management framework, which is contradictory to SA's supposedly "democratic" policy context and therefore creates confusion and complexity in the overall implementation of the NWA.

These results are supported by various studies (Newater, 2006; Ashton *et al*., 2006; du Toit *et al*., 2011), which show that, while the South African policy framework is designed for decentralisation under democracy, the water sector still shows major elements of centralisation and therefore considerable complexity and confusion within the country's water sector have resulted from a mix of contradictory management systems existing together.

According to du Toit *et al*. (2011) and Naster and Hansen (2009), the existing water governance problem in the SA water sector initiated from the pre-1998 water governance system in SA, which was mainly characterised by a purely centralized government, and it

was only in 1998 that the new water legislation, based on decentralised decision-making, was introduced. Previous studies revealed that, even though it is understood that with the introduction of the new water legislation the overall water sector needed to be given time to adapt to this radical transition, there are concerns that it has taken too long for the water sector to adapt, resulting in more complications in terms of implementation of the NWA (Schreiner, 2013).

This study found that the issue of the slow implementation of the NWA is no longer a matter of failing to adapt to change, but it is now a matter of ignorance and unwillingness to delegate management functions to appropriate levels (Folifac, 2006).

II. Water Supply in the Mgeni Catchment

The political empowerment dimension of water governance emphasizes the importance of giving all water stakeholders, including the poor, equal opportunities to influence water-related decision-making. However, previous studies reveal that marginalised citizens, such as the poor, women and slum dwellers, are hardly seen as real stakeholders in water-related decision making and usually lack voices and capacities to express and promote their stake in water (cf. Chapter 2, Section 2.1.1). It was therefore found important for this study to invite and acknowledge the views of households concerning overall water supply and their influence on water management at household and community level. Thus in order to break the circle of marginalisation, this study incorporated the views households through surveys in the form of face-to-face interviews in the four chosen study areas, as described in Chapter 3.

4.7 Demographic Profile of Respondents

Both men and women, participated in the study. However, the majority (77.3%) of the participants in household surveys were women, this being equally reflected in all four study areas.

In terms of historical categories, the majority (65%) of the households were Africans (50% strictly from low-income groups and 15% from high-income groups). Twenty-five percent of the respondents were White and were all part of the high-income community, while 10% of the respondents were Indians and also formed part of the high income group.

The respondents varied in terms of age group, with older people (41-70+) accounting for the highest percentage (72.5%) of respondents.

4.8 Educational Level

The results, as shown in Table 4.9, reveal that 42.5% of all the respondents have no formal education and only partially completed primary school, while 40% of the respondents have tertiary education and lastly, 17.5% of the respondents completed secondary school. Notably, almost all of the respondents with poor education (42.5%) fell into low-income income groups (Noshezi and Zwelibomvu areas), while the respondents with tertiary qualifications (40%) fell into the high income group of the respondents.

Table 4.6 Level of education of respondents (in %) (n=40)

	LEVEL OF EDUCATION						
Income Group	**No formal education**	**Partial primary**	**Primary completed**	**Secondary completed**	**Certificate/ diploma**	**Undergraduate degree**	**Post-graduate degree**
High-income N=20	0%	0%	0%	10%	20%	15%	5%
Low-income N=20	15%	20%	7.5%	5%	0%	0%	0%

4.9 Employment Status

The largest number of respondents indicated that they were unemployed (45%) and of these, 42.5% were from the low-income group, while only 2.5% were from the high-income group. The remaining 55% of the respondents worked different jobs and as expected, all low-paying jobs (below R5000, 00 a month) were occupied by the low-income group i.e. unskilled labour. Likewise it was also noted that all well-paying (more than 10 000, 00 a month) jobs belonged to the high-income group.

Table 4.7 Employment status of respondents (in %) (n=40)

EMPLOYMENT STATUS									
Income Group	**Sales/marketing**	**Unskilled labour**	**Unemployed**	**Self-employed**	**Professional**	**Artisan / technician**	**Home executive**	**Administrative/manager**	**Business person**
High-income N=20	2.5%	0%	2.5%	10%	10%	5%	10%	2.5%	7.5%
Low-income N=20	2.5%	2.5%	42.2%	2.5%	0%	0%	0%	0%	0%

Not surprisingly, the results show a significant link between the household's level of education and the employment status i.e. the high proportion (50%) of the respondents who had indicated that they did not go to school/partial primary/primary school and/or completed secondary (50%), happened to also be unemployed.

4.10 Socio-Economic Characteristics

As expected, the majority of the respondents (42.5%) indicated that they did not have a salary income, but were living off pensions (R1000, 00 per month), child support (R260, 00 per child per month) and foster care grants (R600, 00 per child per month) (SASA, 2013). Only 12.5% indicated that they have an income between R6000, 00 to R15000, 00 and the remaining majority (45%) preferred not to disclose their income and indicated that it was confidential information.

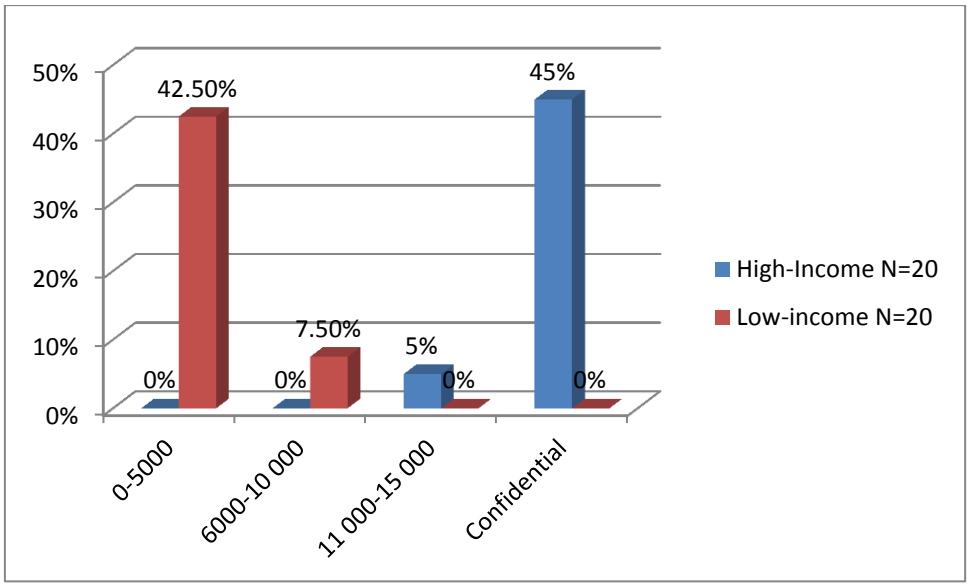

Figure 4.3 Monthly income of the respondents (in %) (n=40)

4.11 Water Supply Equity between High- and Low-Income Households/ Communities in the Mgeni Catchment

The main research question relevant to household informants (RQ: Is the level of water service delivery the same between high- and low-income households/communities?) was analysed, using both quantitative (descriptive analysis) and qualitative methods (exploratory analysis on the participant's insight in the level of water service delivery in their communities).

The results displayed in Figure 4.4 reveal that household accessibility to water varied between low- and high-income households. All high-income (50%) households accessed their water within the house, in the form of treated piped water, while 32.5% of the respondents representing low-income households indicated that their main source of water is piped water within their yards. Another 10% of the respondents, also representing low-income households, indicated that their main source of water is a community tube well, to which they have to walk relatively long distances to collect water. The remaining 7.5% of the respondents indicated that they do not have access to treated piped water and their main source of water is untreated raw water from a river close by. However, it should be noted that these households (7.5%) indicated that they once had a connection to water, but after some time, their water supply just stopped and there were rumours that there was a community member who diverted their water connection to his own house, leaving them

without access to water. Other rumours indicated that the water pipes had been broken by construction activities.

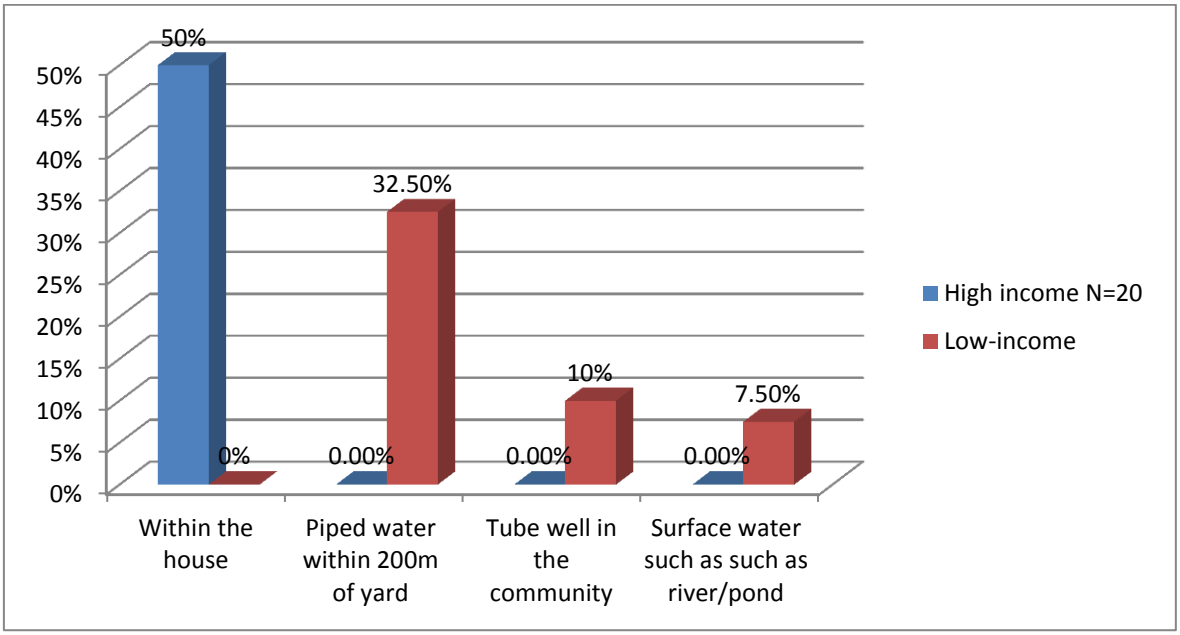

Figure 4.4 Household's main source of income (in %) (n=40)

4.12 Household Level of Satisfaction with Water Supply Received

Research Question 7 (What is the household level of satisfaction with water service received between different income groups?) was analysed quantitatively, using descriptive statistics on the data that was collected quantitatively. The results revealed that all the high-income respondents (50%) were satisfied, while the low-income group was split into 42.5%, indicating that they were not satisfied. 7.5% indicated that they were somewhat satisfied. The given reasons for the dissatisfaction are as follows:

- water supply is not reliable, "we do not have water coming out of the tap at times" (10%);
- not satisfied with free quantity and this water is not reliable, we often have to store water in buckets "free water quantity is too small" (12.5 %.);
- cannot afford paying for water, it is too expensive (2.5%);
- not satisfied with quality, access and reliability and river water is unhealthy (7.5);
- quality of pipes is very poor and their maintenance is very high (5%);
- pipe pressure is too low (5%);

4.13 Barriers to Improved Water Supply in Low-Income Communities

A total of 10 emergent themes were identified that represented the perceived barriers to better water supply in low income communities and these included:

- affordability;
- poor community leadership, poor water infrastructure, poor level of education/lack of awareness, poor water quality, accessibility constraints, reliability constraint, inadequate arrangements or less effort made to warn the community in cases of service disconnection; limited free quantity and lack of ownership.

Table 4.11 presents these ten perceived barriers, along with the corresponding formulated meanings and prevalence rates of each perceived barrier. It should be noted that the results demonstrated in Table 4.8 are the results of the question that applied to low-income households (50% of the sample), hence the frequency values in the Table below add up to 50.

Table 4.8 Perceived barriers to improved water supply in low-income communities

Theme / Barrier	**Frequency (%)**	Formulated Explanation	Sample Participant Statements
Affordability constraints / Poor background / Social Constraints	20%	All factors that limit the household's from having their own water connection including the connection fee (R650.00), monthly payment for water, unemployment	*"We cannot afford to pay regularly".* *"We cannot afford to pay the water connection fee".* *"Most people in this neighbourhood are unemployed".* *"We are not empowered, we/ lack voices".*
Poor community leadership / poor channels of communication	15%	Lack of commitment and support from community representatives such as unreliable local councils.	*"Our councillors are unreliable and not committed to their work".*
Poor water infrastructure	15%	High maintenance of water infrastructure, Poor quality of water pipes infrastructure and low pipe pressure	*"Quality of pipes is very poor and maintenance is very high"* *"our pipe pressure is too low"*
Poor level of education/ poor level of awareness	2.5%	low level of education and water awareness	*"Most people in this community are uneducated and so do not know their rights"* *"Level of water awareness is low"*
Poor Water quality	7.5%	Poor water quality from rivers and tube wells	*"Water quality in the rivers is poor, people often get sick from utilizing river water"* *"People getting skin problems from river water"* *"Water from tube wells tastes bad"*
Accessibility constraints	7.5%	Having to walk long distances to access the water source	*"Water source is too far"*
Reliability constraints / inadequate arrangements or less effort done to warn the community in cases of service disconnection	12.5%	Lack of reliability	*"One minute we have water on our taps the next we do not"* *"We do not get notified when we will not get water supply"* *"we often have to store water in buckets"*
Free quantity	10%	Free quantity too small	*"We were told that we have access to free basic amount but we pay for water every month".*
Lack of ownership	10%	Lack of ownership of water	*"I do not have a say as how to take care of it as it is not my water"* *"Water use is uncontrollable Maintenance of infrastructure not attainable "* *"Water getting wasted"*

Interestingly, affordability was the most highlighted theme, with 20% of the respondents giving a response that fell into this category. Poor infrastructure and poor community leadership/channels of communication closely followed, with 15% for each. Reliability constraints, which included inadequate arrangements or warnings in case of service disconnection, received a frequency of 12.5%. Free water quantity and ownership constraints received intermediate relevance, with a frequency of 10%. The lowest relevance was given to poor level of education or level of awareness (2.5%) and similar results occurred for water quality and accessibility constraints (7.5%).

4.14 Households/Community Participation on Water Management

In relation to the research question (RQ 10), enquiring about the community participation on water management at household level (analysed by both qualitative (using exploratory analysis) and quantitative analysis (using descriptive statistics)), 30% of the participants indicated that they make sure not to leave taps running. Twenty-two-coma-five percent indicated that they reduce water costs by employing measures to save water, such as only using tap water for cooking, drinking, bathing, for religious purposes and using rain and river water for washing, flushing toilets, stocks, cleaning and gardening. 20% indicated that they collect and store water in containers/buckets, rather than opening taps now and again (to avoid unnecessary water leaks and water wastage). Seventeen-coma-five percent indicated that they detect water leaks and report them to the municipality "even though the municipality takes too long to respond", and lastly, 15% of the respondents indicated that they collect rain water and use it for washing and gardening and also read their water meter to check their consumption and reduce it, if it is too high.

4.15 Links between Water Resources Management (NWA) and Water Supply Services (WSA) in the Mgeni Catchment

The link between water resources and water services (RQ10 which was analysed by both qualitative (using exploratory analysis) and quantitative analysis methods (using descriptive statistics)) was first demonstrated by the possible future water management problems that were perceived by the participants in the key-informant interview phase.

Table 4.10 below lists the perceived water management problems that are expected to occur if the right measures are not undertaken to prevent the current situation of water resources:

Table 4.9 Perceived Future Water Management Problems in the Mgeni Catchment

Potential Water Management Problem	Frequency
Increase in water demand due to potential population economic growth	11/13
Waste water treatment works dysfunctions	10/13
Deteriorating water quality/water quality will be compromised (i.e. sand mining impacts)	10/13
Dwindling of water resources due to increase in demand and also due to impacts of climate change in some places	5/13
Problem of allocation of water to everyone	5/13
Will not achieve objectives of NWA and WSA if we do not get the thinking right	5/13

Table 4.10 indicates that the main concern of participants was whether there will be enough clean water available to be accessed by consumers, be it domestic, industrial, for mining or commercial (11/13). This was specifically linked to population growth and economic growth, which is likely to occur in the near future in the Mgeni Catchment, as this will put strain on the available water resources in terms of quantity and quality. The participants also expressed concerns about the results of wastewater treatment works malfunctions (10/13), which will compromise water quality being released to the rivers (10/13). The participants also indicated that they were concerned that poor water quality will likely result in a reduction of water resources usable for consumption (5/13), which will likely results to issues related to equity, sustainability and efficiency in water supply. All this, but especially the latter, is contradictory to the objectives of the NWA and WSA.

The links between water resource management and water service provision were also noted between the perceived major constraints associated with the lack of implementation of the NWA and the perceived barriers associated with the poor water service provision to local communities. Notably, the perceived major constraints associated with the lack of the implementation of NWA were all related to water resource management issues that hinder availability of clean water (inadequate institutional capacity (financial resources), lack of

water management strategies, inadequate water infrastructure, lack of integration, etc.), while the perceived barriers to improved water service provision (especially to low-income communities) were mainly related to water services issues that hinder poor people's access to sufficient and safe water, such as affordability constraints, inadequate water infrastructure, poor community leadership and/or channels of communication and poor level of awareness.

4.16 Discussion of Household Key Findings

This section provides a discussion of the results of analysis of data that was obtained through household surveys.

4.16.1 Household level of satisfaction with water service received

In relation to the seventh research question (RQ 7: What is the household level of satisfaction with water services received between different income groups?), satisfaction levels differed greatly between high- and low-income communities, as all the high-income households indicated that they were satisfied with the water service provision that they were receiving while a significant percentage (42.5%) of low-income households indicated that they were not satisfied at all and a small (7.5%) percentage of the low-income households indicated that they were somewhat satisfied.

The participants' responses were generally attributed to the service provider's inconsistencies in terms of water connection and free water quantity. There were complaints that the households that were serviced by the municipalities (eThekwini and Msunduzi) were getting free water connection and more free water quantity, while the households that are serviced by the bulk water provider, Umgeni Water, have to pay a water connection fee of about R650, 00 and only have a small free amount of water. Moreover, the dissatisfaction levels of the participants were based on poor accessibility, affordability constraints, poor service quality, water quality, free water quantity, inadequate arrangements of warning in terms of water supply disconnections, efficiency, meter reading concerns, delayed leakage response, threats of disconnection for non-payment and poor channels of communication.

These results are consistent with Smith and Green (2005) that satisfaction levels are based heavily on accessibility, rather than efficiency. According to Smith and Green (2005),

household satisfaction levels can be an important indicator, to provide a picture of the municipal performance in terms of water service delivery.

4.16.2 Barriers to improved water supply in the Mgeni Catchment

The households identified various barriers to improved water supply in the Mgeni Catchment (RQ 8: What are the perceived barriers to improved water service delivery in low-income communities?), where the affordability constraints was the most highlighted theme, with the majority of the respondents mentioning this theme. Poor channels of communication/poor leadership, poor water infrastructure and reliability constraints also received significant relevance according to the perceptions of the households.

These results are consistent with various studies (Dlamini, 2007; UNDP; 2007; Tissington *et al*., 2008; UNICEF, 2010; UNEP, 2010) that SA's municipalities are currently struggling to reduce the water service backlogs, especially for the rural poor.

4.16.3 Household/community contribution to water management

In relation to the research question (RQ 9: How do communities or households contribute to water management? (at community and household level)), the households indicated that they contribute to effective water management in various ways, including:

- ensuring that they do not leave taps running;
- reducing water costs by employing measures to save water, such as only using tap water for cooking, drinking, bathing and for religious purposes and they use rain and river water for washing, flushing, stocks, cleaning and gardening;
- collecting and storing water in containers/buckets, rather than opening taps now and again;
- detecting water leaks and reporting them to the municipality "even though the municipality takes too long to respond" and
- collecting rain water and using it for washing and gardening, by reading water meter to check water consumption and reducing it, if it is too high.

4.16.4 Social equity: comparing water service provision between high- and low-income households/communities

In relation to the main research question under the household research design which enquired about whether or not water supply is the same between low- and high- income households in the Mgeni Catchment, the results revealed that this is not the case. Rather, that water supply is not the same between low- and high-income households i.e. high-income households are supplied with water in their houses, in the form of treated piped water, while most low-income households are only supplied with piped water to their yards and some of do not have a water connection to their houses or yards, but use the community tube well as their main source. The households that were using a community tube well indicated that they are not supplied with water in their homes because they cannot afford to pay a water connection fee of R650, 00, hence they use the community tube well as an alternative and have to walk relatively long distances to collect water. Furthermore, a smaller percentage of the households indicated that they do not have access to treated pipe water and their main source of water is the unprotected river water. However, it should also be borne in mind that these households indicated that they once had a connection to water, but after some time, their water connection supply ceased and the real reason for cessation of water supply to these households is not known.

These results are consistent with the reviewed literature (Dlamini, 2007; UNDP, 2007; Tissington *et al*., 2008), while great progress has been made on water service provision in most areas. However, for many poor South African's, especially in the rural areas, access to sufficient water remains an unfulfilled promise.

The initial formulated hypothesis (water service provision is the same between the high- and low-income household in the Mgeni Catchment) is therefore rejected, because the evidence from the results clearly shows that water service provision between high- and low-income households in the Mgeni Catchment is not the same i.e. the high-income communities receive better water service provision than low-income communities.

4.16.5 Perceived links between water resource management and water services in the Mgeni Catchment

With regards to the links between water resource management (NWA) and water services (WSA) (RQ 10: How do water resource management (NWA) and water services (WSA) relate to each other?), the results revealed that the relation between the two is cyclic. This implies that it is a mutual and continuous relationship, where both the Acts inform each other. For example, when observing the key-informants' concerns about future water management in the Mgeni Catchment, it was revealed that both water resources and water services are affected by increases in water demand resulting from population growth. This is likely to be more problematic in future, as the rate of population growth increases each year. This will put a strain on water availability in terms of both quantity and quality, because the increase in demand is likely going to be associated with the increase in consumption, as well as the increase in the amount of waste produced. The increase in the amount of waste might results in wastewater treatment works dysfunctions due to the lack of cleaner technology for use in water treatment works. These will in turn, result in declining river water quality due to the poor quality of water being released from waste water treatment works into the rivers. The poor quality of water in rivers will mean the dwindling of water resources, because having many rivers with poor water quality is as good as having no rivers, as all i.e. treating water is more expensive than buying it from neighbouring countries.

Overall, this will result in the anticipations of the NWA not being achieved. Failing to achieve the objectives of the NWA on the protection and management of water resources in an integrated manner, will result in the purpose of the WSA, in terms of providing sufficient and safe water to human societies and other municipal water users, not being achieved, as there will be less, or no, clean water resources left to provide and supply water.

The linkages between water resources and water services were also demonstrated by both the perceived major constraints associated with the lack of policy implementation of NWA and the perceived barriers associated with improved water supply. The study results revealed that there is a direct causal relationship between major constraints associated with the implementation of the NWA and the barriers associated with improved water service provision, especially in poor communities i.e. the constraints associated with the

implementation of the NWA, such as the lack of institutional capacity and the lack of integrative instruments, are the main causes of barriers to improved water supply, such as inequity. This is because, with the absence of institutional capacity and the integrative policy instruments, the delegation of local water management responsibility to the local level is impossible, as this implies that there would be no capacity and instruments to facilitate water management at local level (CMS). As a result, a participatory approach would not be employed and therefore both the objectives of the NWA and WSA concerning social equity and sustainability will be contradicted and effective implementation issues will prevail.

These results are supported by various studies (DWAF, 2004, DWAF, 2005; DWAF, 2007; DWAF, 2011) and suggest that, in order to achieve effective water management in SA, the links between the NWA and WSA should be acknowledged.

5. RECOMMENDATIONS AND CONCLUSIONS

The preceding chapter presented the results and discussion of the findings from the primary data collection which were used to answer the research questions posed at the beginning of the study. This chapter presents the summary of the key-findings, recommendations and the conclusion which presents an overview of the study and further suggests the future research directions.

5.1 Summary of Key Findings

The initial aim of the study was to examine possible reasons associated with the lack of policy implementation and to investigate integrative instruments for the effective implementation of the National Water Act and the associated challenges in the establishment of policy instruments. This was achieved by the study through conducting key-informant interviews with water management experts in the Mgeni Catchment. The results showed that there are a number of factors associated with the lack of implementation of the NWA. The most significant factors included ineffective integrative policy instruments and institutional capacity, lack of integration between water stakeholders and different departments that impact on the water resource, insufficient monitoring and evaluation of the implementation process and lack of water infrastructure, especially in rural areas.

The first objective of the study was to identify integrative policy instruments for the policy implementation of the National Water Act. This objective was achieved by the study and the results revealed that as the key-informant interviewees indicated that the integrative policy instruments for the implementation of the NWA are the two water management strategies provided for by the NWA (1998), namely, the NWRS and CMS.

The second objective was to identify the major constraints and challenges affecting the process of policy implementation of the National Water Act. The results indicated that the major constraints in the implementation of the NWA includes the lack of institutional capacity (financial and human resources), the lack of integration between the water sector and other sectors that impacts on water resources, the lack of or slow establishment of integrative policy instruments, such as the CMAs and the limited monitoring, learning and evaluation of the implementation process of the NWA.

The third objective was to examine suggestions proposed by the relevant stakeholders (both institutional and local) in relation to the major constraints and challenges affecting the effective implementation of the National Water Act. Table 4.5 in Chapter 4 presented the proposed suggestions by the key-informants as follows:

- there is need to employ capacity-building mechanisms and place the right people in the right positions;
- more financial resources should be allocated in different water institutions;
- the water budget should be spent on water-related expenses;
- there is need to carefully plan and strategize the available integrative policy instruments to enable their proper establishment i.e. NWRS, CMAs, CMFs, CMS;
- there is a great need to fast-track the establishment of the CMAs;
- there is a need to employ an integrated approach to water management;
- there is a need to develop and establish the necessary water infrastructure, especially in rural areas; and
- there is a need for DWA National to develop guidelines for the monitoring and evaluation of the implementation process of the NWA.

The fourth objective was to acknowledge the important links between the NWA and the WSA. The results indicated that the NWA and WSA are directly related to each other, with the NWA informing the WSA i.e. insufficient fresh water resources and poor water quality results in small quantities of water being supplied and poor water service delivery.

Using the concerns of the key-informant interviewees with regards to the future state of water management in the Mgeni Catchment, a lot of concerns arose around the issue of an increase in demand for water as a result of population growth. It was specified that an increase in demand would put a strain on water availability in terms of both quantity and quality, as there would be also be an increase in waste produced as a result of the increasing population. This will results in waste water treatment works dysfunctions, which will in turn, result in the decline of river water quality due to the quality of water being released from waste water treatment works to the rivers. As a result, the purpose of the NWA, which includes the protection and management of water resources in an integrated manner, will be contradicted. The same will happen with the purpose of the

WSA in terms of providing sufficient and safe water to households and other municipal water users, because there will be less or no clean water resources left to provide water.

The results revealed that the relationship between water resources and water services is cyclic and causal, where water resources management informs water services, and therefore it means that, if we are to achieve the objectives of equity and sustainability, water services should be dealt with integratively.

5.2 Recommendations

This section provides recommendations on mechanisms and activities that successfully facilitate the implementation process of the NWA. The following recommendations are made, based on the findings and discussion from the previous chapter.

5.2.1 Local stakeholder participation and involvement

Steps should be taken to increase community participation and involvement in the water management platforms, such as CMFs, in order to ensure effective water management at local level. More social learning stakeholder platforms, where key water stakeholders, different sectors related to water management, as well as civil society are represented, should be considered, to allow for the effective management of water resources and to allow learning by doing between various stakeholders.

In order for water management to bring about positive change to all parts, but especially the most impoverished parts of society, local communities must have a say in how they want their water resources to be managed. This can be achieved by adopting and maintaining a more consultative and inclusive approach in the planning and management of water resources through community meetings with residents and residents' associations. Involving residents in the entire process will encourage mutual respect between stakeholders, but more importantly, will guarantee effective water management due to the level of support and participation of the residents.

5.2.2 Communication and dissemination of information to the local level

Effective communication and the distribution of information are key to increasing the levels of awareness. Key water stakeholders should provide communities with regular feedback and updates pertaining to water issues concerning them. This could assist in

minimising the potential future water restrictions and domestic water quality issues. Concerns related to water problems that could potentially occur should be addressed and communicated, using a multimedia approach well in advance, so that communities are aware and well-prepared. Information should be made freely available to society by assigning a dedicated call centre, radio broadcasts, print media and electronic mediums like websites, etc.

5.2.3 Integrative management of water resources and water services

Due to the importance of the identified links between water resource management and water services, this study strongly recommends that the management of water resources and water services must be done integratively. This implies that:

- mechanisms for better co-ordination between water resource management and water services must be established, to ensure the sustainable use and protection of water resources;
- water service needs for a Water Management Area must be incorporated in the guidelines for preparation of the CMS;
- upon their full establishment, CMAs must have an input in the Provincial Water Sector Plan (PWSP), to ensure that the catchment water needs are incorporated. In that way, the priorities set by the CMAs and the priorities set by the Water Services Sector will be integrated, to ensure the efficient planning of resource use;
- There must be continuous cross-communication between CMAs and the WSA i.e. CMAs must be consulted when the Water Services Development Plans are compiled; and
- The relationship between the CMAs and WSA must be clearly stated in the CMS guideline

5.3 Conclusion

The NWA is regarded as the one of the most advanced pieces of water legislation in the world. However, the findings of this study indicate that the effective implementation of this Act has not yet been achieved. Table 4.5 in the results section shows that the prevailing issue of implementation of the NWA results from a lack of various factors, with the most significant factors being the lack of institutional capacity in the water sector, ineffective integrative policy instruments, such as CMAs, the lack of integration between

the water sector and the other sectors that impact on water resources and last, but not least, the limited monitoring and evaluation of the implementation process as a whole.

In conclusion, the findings of this study present a range of opportunities for future research:

- According to the results in Table 4.5, there is need for continued and further research into integrative instruments for the implementation of the NWA, especially those that are specifically designed for the NWA i.e. the NWRS and the CMS, in order to ensure that the current establishment of the 9 CMAs is as effective as possible, thereby ensuring the effective implementation of the Act and the continued monitoring of the overall process.
- The results displayed in Table 4.6 indicate that future research needs to concentrate on investigating measures to overcome the existing major constraints associated with the implementation of the NWA i.e. the lack of institutional capacity, limited integration between water stakeholders, poor usage of integrative policy instruments, poor water infrastructure and wrong attitude of water stakeholders' towards water management responsibility.
- The overall results of this study, drawn from both the key informants and household surveys, indicate that understanding the stakeholders' (both local and institutional) perceptions and attitudes towards water management can enable water policy implementers to strategically plan and manage the implementation process effectively, while also taking into account the community's satisfaction with the water services delivered to them.
- The overall findings of this study call for more research to be undertaken in the Mgeni Catchment in the form of longitudinal studies, to assess changes in household/community level awareness, perceptions and attitudes towards water management, including supply.
- This research should be replicated in other catchments in South Africa, especially in the most rural areas of South Africa, in order to measure and assess households' awareness, perceptions and attitudes towards water resource and service management in a consistent manner, using a standardised questionnaire.

In closing, this study has shown that there is a significant conflict of interests between the existing centralised and decentralised water management approaches and instruments (Table 4.4) in the South African water framework. However, I strongly believe that the interplay between the two approaches should not be a problem, as long as co-operation between all levels of governments is maintained continuously. The aim must be to work together as one nation and Co-operate, Co-operate, Co-operate!

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7. APPENDICES